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MINNESOTA MEDICINE

Journal of the Minnesota State Medical Association

VOL. IV AUGUST, 1921 No. 8

ORIGINAL ARTICLES

SOME OBSERVATIONS ON THE CHRONIC FORM OF LETHARGIC ENCEPHALITIS.*

C. EUGENE RIGGS, M. D.
St. Paul, Minn.

In a recent note[1] on lethargic encephalitis, I reported two cases as illustrative of the chronic form of the disease, one of them manifesting the Parkinson syndrome. So little was definitely known about the infection that I used the term "chronic" with much hesitation. From 20 to 40% of the patients suffering from Epidemic Encephalitis die during the acute attack. Two of my patients recovered after a year's illness. Grossman[2] states a majority make a functional recovery after an illness varying from six to twenty-four months. All of us have observed a progressive disease of the nervous system follow this infection. The study of the cases in this report has materially clarified my views and justifies my assertion that in addition to the acute form there also occurs a subacute or chronic infection.

Encephalitis lethargica is not the modern disease that many observers would have us think. Crookshank[3] states that "during 450 years at least, outbreaks in many clinical and epidemiological forms have invariably appeared in definite relation to epidemics of influenza"; the commonly recognized form being that of the acute attack lasting from ten days to several months. The symptomatology of encephalitis is protean, greatly exceeding that of lues, the differentiation being at times a matter of great difficulty and can only be determined by the seriologic findings. The infecting virus has a predilection for the brain cortex and the brain stem; no part of the nervous system, however, is immune. Spinal forms of the disease have masqueraded under the guise of atypical manifestations of poliomyelitis, both conditions occurring sporadically. Localization of the infection may be isolated or disseminated. The point of attack may be the meninges, the ventral or dorsal roots, the dorsal root ganglion or the cord itself.[4] Some outstanding symptom dominates the clinical picture and indicates the nervous structures affected. In 121 of the 864 cases collected by Weschler, there were definite predominating symptoms; in other words, in only 14% of the cases could an attempt at classification be made. The futility of a permanent classification on a purely symptomatic basis is clearly apparent.

The report of these five cases of encephalitis is interesting because of their chronicity and their protean and perplexing syndrome. The term "chronic" possesses a double meaning —that of duration and in addition that of "an active change or process." It is the existence of the latter that makes the recognition of these cases so important and affords therapy at least a chance to avert ultimate nervous disaster. Buzzard has shown that in epidemic encephalitis, atheromatous changes take place in the blood vessels of the central nervous system. Abrahamson[5] thinks that the occurrence of these atheromatous changes and the chemical aberrations due to the involvement of the endocrine glands suggest the probability of a chronic and toxic type of the disease.

The syndrome of this chronic infection is as varied as are the physiologic and psychologic activities of the central nervous system. The most usual symptoms are headache, vomiting, diplopia or blurring of vision, insomnia, restlessness, morbid apprehensions, fatigability, radicular pain, stiffness of the neck muscles, Kernig's sign, motor aphasia, hemiparesis, generalized tremor, tremor of the tongue and facial muscles, the Parkinson face, attacks of mental confusion, sweating, depression, hal-

*Read before The Ramsey County Medical Society, May 23rd, 1921.

lucinations of sight, causeless laughing and crying, menstrual irregularities, low blood pressure, tachycardia, slow or rapid pulse, etc.

Case I. Miss A. Referred by Dr. Archibald MacLaren, Jan. 13, 1921. Age 28 years; father died of appendicitis in 52nd year; Mother is in 69th year and well; five brothers and two sisters all living and well; usual childhood infections; small-pox in 12th year. Tonsillectomy four years ago. Previously to this, there had been attacks of neuralgia, the pain being generally over the left eye; these attacks ceased after the removal of the tonsils. A year ago last fall, she had ptomaine poisoning; she was in good health until an attack of influenza last March. There was high fever, headache, marked drowsiness, etc. After the influenzal attack, there developed diplopia and the patient was very tired and drowsy; in this condition she returned to her teaching; shortly afterwards she complained of cold sensation over the vertex and pain which was located over the left eye and diffused itself over the forehead; there was also pain over the nape of the neck and back of the head; there was vomiting and vertigo; she was subject to sensations of heat followed by cold and a profuse perspiration all over the body. There had been sharp, irregular pain in the arms and legs also hallucinations of sight ever since the illness began, which had practically ceased. She had spells of being disoriented as to place and time. She had to give up her work frequently and go home; as soon as she was a little better, she would resume her teaching. In June 1920 she greatly improved; the symptoms practically disappeared with exception of the diplopia, which was much less marked. There was still present a cold perspiration and occasional mild headaches; she felt weak and exhausted. Since the first she has noticed her mind was not as alert nor her memory as good as formerly.

The latter part of October the symptoms returned; the headache greatly increased in severity and became unbearable; she became weak and was unable to sleep; the diplopia, however, disappeared. It was at this time she consulted me. The movement of the neck muscles was very painful and there was a Kernig in both legs. All fall, there were daily spells of vomiting and marked depression; the headache was so severe that she had to be kept under anodynes; the sinuses were negative; the suffering was so intense, she said if opportunity had offered, she would have taken her life. There was Kernig in both legs. Blood pressure 130 systolic, 80 diastolic; hemoglobin 82 per cent; red blood cells 4,360,000; white blood cells 11,800; urine showed a trace of albumin. The pressure of the spinal fluid was normal; no globulin; four cells per c. mm. and goldsol reaction 0001100000. On March 1st, she developed trouble with the middle ear. She left the hospital April 15th apparently well.

Case II. Miss J. Referred by Dr. J. S. Gilfillan, Feb. 24, 1921. Age 25; teacher; parents living and well; usual childhood infections; strong and vigorous until school year 1918-1919 during which time she taught subnormal children. As a result of this she became very nervous. In October 1919, she had an attack of influenza; she was in bed a week, after which she resumed her teaching, but she was very weak, complained of being exhausted and was compelled to give up her work. At this time she had severe headache and a persistent insomnia; she said she felt as if she could not drag herself around; there was diplopia and marked inco-ordination of both upper and lower extremities; she was lethargic and would drop to sleep the moment she sat down; this lethargy continued for more than three months; there was also a generalized tremor all over the body; the flesh was sore to pressure and the skin hyperesthetic; there was in addition at this time a constant aching of the upper and lower extremities, especially the latter. The symptoms persisted until the spring of 1920 when she again went back to her teaching, shortly after which she began to improve and during the summer felt quite well. In the fall she had an attack of bronchial pneumonia with a recurrence of the former symptoms. The headache was very severe and there was a great deal of pain in the neck and down the spinal column; at this time she developed attacks of momentary mental confusion when she was unable to comprehend what was said to her. She could not see distinctly and there was a motor aphasia. In addition to these symptoms she was exceedingly nervous and very hysterical, being subject to crying spells and becoming terrified because of a sense of impending trouble as to the character of which she had no conception; she was very much depressed. The physical examination was negative aside from the existence of an ovarian cyst which had been developing for the past two years. The neurological examination was negative aside from a double Kernig. Hemoglobin 86 per cent: red blood cells 5,850,000; white blood cells 8,600; blood pressure 112 systolic, 76 diastolic; urine negative. The spinal fluid indicated pressure; there was no globulin; two cells per c. mm. The goldsol reaction was negative; Wassermann negative. During her stay at the hospital the pulse ranged from 80 to 106; the temperature ranged from subnormal to 99.4. She left the hospital April 20th, somewhat nervous because of the approaching ovariotomy—otherwise apparently normal.

Case III. Miss C. Age 20. Referred by Dr. A. H. Aanes, Red Wing, Minn., Jan. 17, 1921. Family history negative. Appendectomy at 13; four months ago exodontia of two abscessed teeth. Since 14 years of age she had not been very strong. She had influenza twice in 1918 and apparently recovered but has not been as well as formerly. Ten months ago she developed an acute otitis media of the right ear. The right hand and arm became painful, numb and weak and she has since been unable to use either. During the last week her right leg became affected; it is painful, numb and paretic; there is a persistent headache and insomnia; for months she has suffered from diplopia; both knee-jerks plus, the right spastic;

Achilles normal. A left hemianesthesia is present; the background of the eyes, normal; pupils respond to light and accommodation normally. Blood pressure 118 systolic; 56 diastolic; hemoglobin 78 per cent; urine negative. This patient, Dr. Aanes writes me (May 5th) has had a rather stormy experience. After her return home, he made a spinal drainage at my suggestion. The next day she developed La Grippe which she attributed to the lumbar puncture and would have no more of them. Later she developed bronchitis and mumps. A month ago she again sought medical advice. A diagnosis of hysteria was made in spite of her history of two previous attacks of influenza, a subsequent hemiparesis of right arm and leg, associated with pain and numbness, a persistent headache, a diplopia of months' duration and a spastic right knee-jerk. Her present condition, the doctor states, is about the same as when I examined her.

Case IV. W. Lawyer; age 36; parents living and well; one sister died of intestinal tuberculosis; one of influenza; usual childhood infections; typhoid in 14th year; tonsillectomy a year ago; no venereal infection; an athlete, knocked unconscious while playing foot-ball, but no after effects. An old right facial paralysis. One child; wife has had no miscarriages. He was perfectly well until exposure to a blizzard a year ago. He was delirious, nauseated, and says he was foolish but does not remember much about this illness; he says there was difficulty of speech and that he could not find the word he wanted to express himself, that he was exhausted, apathetic and spent most of his time lying around. Ever since this illness, he has been slow in his movements, somewhat sluggish mentally. He is depressed, always tired, lacking in endurance, and laughs in a silly manner if excited. There is a marked tremor in the facial muscles and lips and tongue; no noticeable dysarthria, no sensory disturbances, no Rhombergism; deep and superficial reflexes normal; pupils react to light and accommodation normally; red blood cells 4,360,000; white blood cells 9,800; hemoglobin 90 per cent; blood pressure 124 systolic, 68 diastolic; urine normal; blood Wassermann negative; spinal fluid gave a negative Wassermann, Nonne 1 plus, 9 cells per c. mm., goldsol reaction 0001110000. Because of the diagnosis of paresis in this case we gave a provocative injection of Neosalvarsan and the serologic examination made in two laboratories gave the following findings: Nonne 1 plus, 3 to 9 cells per c. mm., blood Wassermann negative, spinal fluid Wassermann negative, colloidal gold curve 0001110000.

Case V. Mr. H. 55 years of age; referred by Dr. Archibald MacLaren, Jan. 14th, 1921. Apr. 28, 1920, he was apparently in the best of health; a few minutes after twelve o'clock he began to suffer from headache which became more and more severe and lasted three days. At this time he said that he had sensations of cold all over the body, was perfectly conscious but was so distressed that he felt he was dying. His heart was very irregular; he was given a hypodermic of morphia and slept for nearly nine hours; he was lethargic for two days. His wife tells me that she could easily waken him and he would answer correctly but immediately fall asleep. After this he was delirious for three weeks. There was no fever throughout the sickness. Five weeks after he was taken sick he developed diplopia which lasted until the second week in October. His wife states that a week after he was taken ill he did not use the left arm as freely as the right; this lasted for three days. The right was in constant motion. Left lateral homonymous hemianopsia; fundus normal; central vision approximately normal. During this sickness there was a marked albuminous urine. At present, in addition to having little endurance, he is exceedingly nervous and slight things annoy him beyond what they should. He worries constantly because of the hemianopsia. The neurological examination is absolutely negative; blood pressure 166 systolic, 96 diastolic; urine normal. Blood Wassermann negative. No blood count made.

In H. approximate recovery has taken place; the distressing nervousness will probably disappear; the left lateral homonymous hemianopsia will be permanent; he is able to read about normally with glasses. There are two further points of interest, i. e., the absence of fever and the suddenness of the attack. The fulminating form of which the latter symptom is an instance may occur with the suddenness of an apoplexy. Bramwell has observed three cases of what he calls the apoplectiform type.

Case VI. C. is an excellent illustration of the mild form of acute lethargic encephalitis and is reported to stress the value of the Barany test in determining a focal infection point.

C. Age 28; referred by Dr. C. L. Larsen. Jan. 27, 1921. Parents living and well; mother somewhat nervous. Empyema 15 years ago; otherwise never ill nor injured; denies venereal disease. Two weeks ago contracted a cold; had a sore throat and ran a temperature for one day that he knows of; had a dull headache part of the time and the left side of the face was sore; four days ago he began to have diplopia; for past several days there has been lethargia, headache and attacks of vertigo; no vomiting; slight Kernig; memory good; is active mentally. Hemoglobin 90 per cent; blood pressure 130 systolic, 60 diastolic; urine normal. Serological findings normal. The Barany test showed a spontaneous lateral nystagmus on looking to the right and to the left, also a rotatory and vertical nystagmus on looking up. Both the turning and caloric tests show an absence of past-pointing or vertigo from both the horizontal and vertical canals of the left ear (Larsen). This would indicate a lesion somewhere in the left superior cerebellar peduncle.

Concerning the subacute and chronic forms of this infection but little is known. Of the nature, character and scope of the pathological forces, "the sheltered and emasculated organ-

isms," the perverted chemical changes due to endocrine implication and the ability of nature to come back under adverse conditions, we can as yet only conjecture. Ely[6] has reported four cases, two occurring in 1919, two in 1920, none completely recovered. The patient most improved still experiences occasional attacks of diplopia. One of my patients made an approximate, two, an apparent recovery. In Miss C., in whom later a diagnosis of hysteria was made, the symptoms remain essentially unchanged. The case of W. is instructive because of two things: the possibility of mistaking encephalitis for paresis and the unreliability ever present in serological examinations.

There is a certain type of cases such as the Parkinson syndrome, the chronic choreas and the progressive inflammations of the cord in which the prognosis is most unfavorable. Courtney has seen the Parkinson syndrome disappear, as well as change into a general clonic myospasm which lessened in severity but did not cease. There are certain cardinal symptoms that should be emphasized; the slight increase in leucocytes present has little significance; it is absent in the lethargic[7] and present in the myoclonic type of encephalitis. Insomnia is a dominant symptom as is lethargy; the former is a characteristic finding following encephalitis in children.[8] Two of my cases showed a definite remission and this has also been observed during the acute attack. Miss A. was greatly distressed by hallucinations of sight, a symptom also common to the acute stage in which most of the hallucinations are visual.[9] Depression is generally present; in two of my patients this was associated with suicidal tendencies. Diplopia and blurring of the vision is as common in the chronic as in the acute forms of encephalitis and it requires skillful questioning to elicit it. It is due[10] to an infiltration in the region of the substantia nigra with lymphocyte-like cells implicating the fibers of the third nerve as they pass out. The Kernig sign is seldom absent; it is most persistent and possesses a prognostic value. All the patients that I have examined have complained of a feeling of distressing weakness and referred to this more frequently than to any other symptom. The spinal fluid changes, if any, are usually very slight and are essentially the same in the acute and chronic forms. Increase in pressure may or may not be present; the same is true of globulin; the cell count ranged from two to nine lymphocytes per cu. mm., the goldsol reaction varies from 0 to the paretic curve.[11] The usual reaction is that of syphilis. Barker[12] reports a "combined paretic and meningitic curve," also an atypical paretic curve. Thompson has observed atypical paretic curve. This is as it should be for the paretic curve simply indicates parenchymatous involvement. The prognosis with our present knowledge carries but little certainty but we hope Grossman's optimism will be confirmed by future observations. Physiological rest in so grave a disease as inflammation of the brain is a matter of imperative moment. After a week of this enforced rest, the distressing restlessness observed in certain cases usually disappears. Should there be increased pressure of the spinal fluid, or a definite goldsol reaction, spinal drainage should be made; indeed, in absence of the above conditions it is often followed by notable benefit. The injections of the nucleinates, lumbar puncture with the subcutaneous injection of the patient's spinal fluid[13] (Regett), and the intraspinal injection of the patient's blood serum (Brill) found beneficial in the acute attack, are well worthy of trial. The use of mixed or individual glands according to the indications is to be advised. When there is great restlessness, bromide is indicated. Pain should be relieved by aspirin and phenacetin. Careful alimentation is of vital importance and galvanism and massage in certain cases have a definite place.

Note: In an article on the serology of the spinal fluid and blood in epidemic encephalitis by Kraus and Pardee appearing since this paper was written, they arrive at the following conclusion—that there is an increase in the spinal fluid sugar; that there is a lack of correspondence between the amount of spinal sugar which is invariably increased and that of the blood which is never increased; that the increase of cells, globulin and sugar, with changes in the colloidal gold curve is a tetrad of laboratory findings possessing a diagnostic value.

BIBLIOGRAPHY

1. **Riggs, C. Eugene; Three Neuropsychiatric Notes. Minn. Med. March 1921.**
2. **Grossman, Morris; Late Results in Epidemic Encephalitis. Archives of Neurology and Psychiatry, May 1921.**
3. **Crookshank, F. G. Past Appearances of Enceph-**

alitis Lethargica. The British Medical Journal, March 26, 1921.
4. Riley, Henry Alsop; Spinal Forms of Epidemic Encephalitis. Archives of Neurology and Psychiatry, April, 1921.
5. Abrahamson, Isador; The Chronicity of Lethargic Encephalitis. Archives of Neurology and Psychiatry, Oct. and Dec. 1920.
6. Ely, Frank A. Epidemic Encephalitis; Residual Symptoms; Chronicity and Relapsing Tendency. The Journal of Nervous and Mental Diseases, February, 1921.
7. Ellis, Arthur W. The Myoclonic Form of Acute Epidemic Encephalitis. The Lancet, July 17, 1920.
8. Abrahamson, Isador; Mental Disturbances in Encephalitis. The Journal of Nervous and Mental Diseases, September, 1920.
9. Hopp, Wm. H., and Blackfan, Kenneth D. Insomnia Following Acute Epidemic Encephalitis in Children. The Journal of the A. M. A., Nov. 13th, 1920.
10. Bramwell, Edwin, and Miller, James; Encephalitis Lethargica. The Lancet, May 29th, 1920.
11. Thompson, James Lloyd; Interpretation of the Paretic Curve in Lange's Colloidal Gold Test. Archives of Neurology and Psychiatry, February, 1921.
12. Barker, Llewellys F., Cross, Ernest S., and Irwin, Stewart V. On the Acute and Subacute Nonsuppurative Inflammations of the Nervous System in the United States in 1918-1919; Encephalitis; Encephalomyelitis; Polyneuritis and Meningo-Encephalomyelo-Neuritis. The American Journal of the Medical Sciences, February 1920.
13. Bassoe, Peter; Nervous and Mental Diseases. Practical Medicine Series, 1920.

BILATERAL CYSTOCELE OR CYSTIC DILATATION OF THE LOWER END OF THE URETERS: A SUCCESSFUL METHOD OF TREATMENT*

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Civiali mentioned cystic dilatation of the ureter in 1843. In 1856 Lilienfeld reported the first pathological specimen. The first diagnosis of this condition was made by L. Wolf in 1899.

*Presented at the Third Annual Meeting of the Association of Resident and Ex-Resident Physicians of the Mayo Clinic, Rochester, Minn., May, 1921.

Dr. M. Lavandera, in a recent paper, collected sixty-four cases of ureterocele. Forty-seven of these occurred in the living and seventeen were post mortem specimens. In this series thirty-two of the sixty-four cases reported had other urinary malformations.

Embryology: The first bud of the renal system which eventually becomes the kidney and ureter begins early in the second month of fetal life as an outgrowth from the dorsal side of the Wolffian duct just before it terminates in the cloaca. This outgrowth which is called the renal bud, the stalk of which represents the ureter, develops in a general upward direction and eventually forms the renal pelvis.

In time, the cloaca differentiates and becomes smaller. The openings of the ureters and the Wolffian ducts about this time are to be found in the embryo bladder, which is derived from the cloaca and the allantois.

Later the ureters and Wolffian ducts separate from above downward so that they acquire separate openings. The space between the openings at first becomes larger and develops into the prostatic urethra. Eventually, the Wolffian duct, which becomes the vas deferens in the male, empties into the prostatic urethra as the ejaculatory duct, while the ureter terminates in the trigone of the bladder.

It may be assumed that the deformity, of which we are writing, is caused by a failure in the development of a sufficient lumen in the renal bud near its lower end as it joins the bladder. It is also possible that the mucosa of the bladder develops an insufficient opening for the outflow of urine.

Etiology: In our opinion cystocele or cystic dilatation of the lower end of the ureter is congenital in origin, although an acquired type is possible. The latter may be the result of the impaction of a small stone in the ureter just beneath the mucosa of the bladder.

A post mortem specimen reported by Smith, in which he found bilateral ballooning of the lower end of both ureters, indicates that obstruction due to stone cannot in itself be assigned as a cause of this condition. In this pathologic specimen, which Dr. Smith reports in detail, a stone was impacted in the lower end of the right ureter, while on the left side, in which the congenital dilation was the greater, no stone was found. The ureteral

opening on this side was so small that no stone could have been passed.

We are of the opinion that ureteral stone may be permanently arrested in the lower end of a cystic ureter because of the tiny opening. However, the stone is the result and not the cause of this deformity.

Symptoms: In the absence of infection, the majority of patients with this condition have not had symptoms which indicate obstruction to the outflow of urine. When infection takes place, however, symptoms usually develop rapidly and in many instances the patient has a very severe time. Prolonged pain of an aching character, but not severe, usually beginning in the flank and referred to the bladder area, is frequently observed. In many instance, however, the pain is severe, colicky in character and greatly resembles that found with ureteral stone. There is usually no gastro-intestinal upset, although some vomiting may occur.

It is difficult to differentiate this condition from appendicitis, gall-bladder disease, or pelvic infections. The patient whom we report and many of those whom we have been able to find in the literature, have had some abdominal operations without relief.

Very recently, we observed a patient who had bilateral, pin-point ureteral openings situated on cone shaped tumors in the base of the bladder. The catheterized urines contained pus. The patient had a history of right lumbar pain, accompanied by temperature and gastro-intestinal upset. She had complained for about one week of pain and temperature before her urine was examined. She had no symptoms referable to the bladder. The x-ray examination of both kidneys, both ureters and bladder was negative. A No. 4 ureteral catheter could not be passed with the ordinary direct vision cystoscope because the openings of the ureters pointed backward toward the roof of the bladder. An indirect instrument that would permit of catheterization at a right angle was used. With this instrument and after long, tedious manipulation, an ureteral catheter could be passed. Because of the tiny ureteral openings and the difficulty of catheterization, a right pyelogram was made to determine the presence or absence of hydronephrosis. The pyelographic shadow demonstrated a slight degree of enlargement of one calyx, the ureteropelvic juncture being slightly wider than normal. This patient had not had a previous history of lumbar pain. The deformity found at the lower end of both ureters was a congenital condition and symptoms had not been produced until infection had taken place. We were able to find very badly diseased tonsils which were removed. Repeated dilatation of the ureters, together with lavage of the kidney pelves, relieved this patient of her pain and discomfort. The urine after two weeks treatment was free from pus and no growth could be obtained upon the ordinary culture media. This patient had other genito-urinary malformations.

Cystoscopic Findings: With the cystoscope, we have recognized two types of cystocele. With the mild type, the outlet of the ureters is a prominence or cone shaped tumor on the floor of the bladder. The openings of the ureter may be on the apex of the cone or may be located on its side or the opening may point posteriorly. This condition may be unilateral or bilateral. The urine usually leaves the opening in a tiny jet and not with the force that is observed when the ureter is normal. It is difficult to introduce a catheter because of the tiny opening and in many instances, in our experience, an opiate or an anesthetic had to be used before a catheter could be passed.

A more severe type of this condition is one in which the ureter in its course through the bladder, is observed as a distinct ridge, varying in width from one-quarter to over one-half inch. The portion of the ureter that protrudes into the bladder is usually club shaped and is broader than that portion which passes through the bladder wall. This clubbed end will increase in size as the urine passes through the ureter and decrease as the urine flows into the bladder. When this tumor is filled with urine, it will transmit light, as does a hydrocele. The opening of the ureter may point forward, toward the roof of the bladder, toward the side, or posteriorly. When the openings are so situated, it is very difficult to introduce a catheter.

Kreisel and Gehl differentiate prolapse from ureterocele. In their opinion, prolapse has a pedicle base and a broad top, the exit of the ureter being centrally located. With ureterocele, they find a broad base, the ureteral

opening usually located eccentrically. With prolapse, it is possible to replace the mucosa into the ureter with the ureteral catheter, while with ureterocele, this cannot be done.

Diagnosis: A diagnosis can only be made by cystoscopy or by surgical exploration of the bladder. This condition may be overlooked unless pus is found in the urine or unless a routine cystoscopic examination is made.

Treatment: Many methods of treatment have been reported. Most writers find that excision is the best method. When the tumor is excised, the mucosa of the bladder is stitched to the mucosa of the ureter. Some observers have reported that recontraction has taken place after such operations—in fact, one writes that no method of treatment that he knows of will permanently cure this condition, as recontraction always takes place. In the few patients which we have observed, open operations have not been necessary.

Intravesical operations, such as slitting the ureter and dilating with catheters and bougies, have been tried. In one or two instances, the high frequency current has been used without success. Pollet, in a recent article published in the Journal d'Urologie, Paris, recommends electrocautery.

In the mild type of ureterocele, in which the ureteral outlet is situated on a small cone shaped prominence in the bladder, dilatation with ureteral catheters, together with thorough lavage of the pelvis, of the kidney and ureters, has been sufficient. We have always, however, endeavored to locate the original focus of infection which in most instances has been in the tonsils, in the teeth, in the sinuses, etc.

When the ureterocele is large and the patient complains of obstructive symptoms, we have been able to produce more than temporary relief by using the cold fulgurating wire. As will be described below, a very large ureteral opening can be made in this manner, which in our experience, does not contract. If contractions does take place, the ureter should be transplanted elsewhere in the bladder.

The following report illustrates the more severe type of this condition:

Patient—Male, age thirty years.

Present Complaint—Pain in both groins and flanks.

Family History—Negative.

Past Illnesses—At the age of ten or eleven years, this patient remembers having had a pain of a definite character on both the right and left sides of his abdomen. At first this pain was not severe, but it gradually became so and he was operated upon five years ago for appendicitis. There was no relief from the right abdominal pain following the operations. In patient's opinion, the pain was brought on by heavy work or overwork. There is no venereal history and none of previous diseases or infections.

Present History—In October, 1920, patient was seized, while ploughing, with a very severe sickening pain in the right groin and testicle. This doubled him up, he perspired freely, became extremely nauseated and vomited. The patient described the pain as being steady, with radiation up and down the right side and into the testicle. The patient will not commit himself as to the pain in the right side beginning in the flank and radiating to testicle, or vice versa. This pain lasted three or four hours and was relieved by a hypodermic of morphine. He thinks he had some frequency of urination during the attack. However, no blood was present in the urine.

February 1st, 1921, patient had the same type of attack as recorded above. A hypodermic of morphine was given for the pain. No hematuria was present at this time, nor does patient remember urinary frequency. This second attack was on the left side.

Physical Findings—The patient is a well developed young male; weight 170. Wears glasses. The tonsils are large and ragged; however, no pus was demonstrated. The teeth revealed focal infection. Chest negative. Abdomen revealed nothing other than an old appendectomy scar. The extremeties are negative. Complete gastro-intestinal examination negative. Patient was referred for x-ray examination which was negative for calculus in the urinary tract. The urine contained an occasional blood and pus cell.

The first cystoscopic examination was made February 3, 1921. The ureters appeared as ridges on both sides of the bladder and ended in larger club shaped tumors (see drawing). The tumors increased and then decreased in size as the urine passed through this portion of the ureter. On the right side the swelling was greater. During the first examination it was impossible to catheterize the ureters. The tumor on the right side transmitted light when filled with urine.

February 4, 1920, under caudal anesthesia, with an indirect instrument, I was able after manipulating for many minutes, to introduce a very small catheter into each ureter. A bilateral pyeloureterogram was

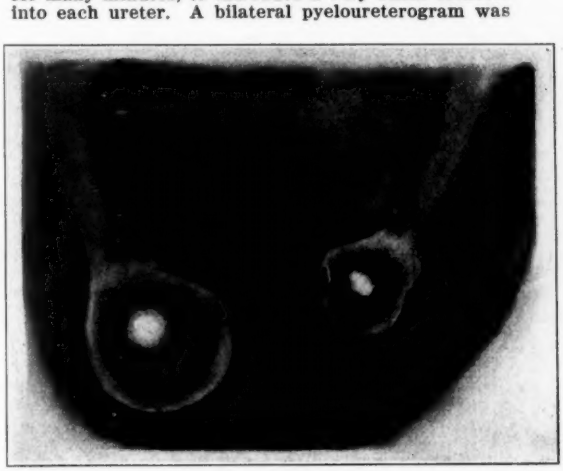

Fig. 1. Cystic dilatation of the lower end of both ureters as seen through the direct vision cystoscope.

made. On the right side, the ureter was distinctly enlarged with moderate dilatation of the pelvis; on the left side, the ureter was not completely filled so that the shadow was indistinct. There were occasional pus and blood cells in the catheterized specimen.

February 8, 1920, patient was again cystoscoped in the office. The cystic tumors were still present. With a cold wire cautery and the high frequency current, a hole was made in the cystic tumors. The wire was forced into the tumors parallel to the ureters so that a hole would not be made through the bladder wall.

Two hours after the cautery, the patient had very severe bilateral lumbar and low abdominal pain. It was necessary to give him large doses of morphine before he was at all comfortable. Because the pain continued, the patient was sent to the hospital for observation. While in the hospital, he developed a temperature of 104.4. The attacks of pain became less frequent but were just as severe as before. Eventually, the pain disappeared from the left side but remained in the right. After a week in the hospital, patient was free from temperature and pain. The amount of urine passed during the stay in the hospital was normal.

Fig. 2. The same condition two months after operation—the openings of the ureters are large and do not contract.

On the second of March, about one month after the cautery, he returned for examination. At this time both ureteral orifices were open, the openings being one-quarter of an inch across. Urine could be seen spurting from these openings as in a normal case except that the valve action was not observed. Patient returned again in one month. He reported that he had had no pain and was free from trouble with the exception of slight frequency of urination. The cystoscope was passed and both orifices were found to be normal except that they were open and did not close as does the normal orifice.

This patient has been entirely relieved of his trouble and is now in excellent health. Although sufficient time has not elapsed for a contracture to take place, we believe that this patient will remain entirely well. He will be examined two or three tims each year. The tonsillar infection, together with the infected teeth, have been thoroughly treated.

In many of the reported cases, a recurrence of symptoms is frequent no matter what operation or treatment has been adopted.

After careful study of the few patients whom we have observed and those reported in the literature, we suggest the following:

1. Ureterocele or cystic dilatation of the lower ureter is congenital in origin.

2. Symptoms from this deformity may not appear unless urinary infection occurs.

3. The mild type can be relieved by dilatation of the ureter. The severe type requires some operation which opens the ureteral outlet permanently. In our opinion, fulguration, if properly done, will make a permanent opening.

4. To effect a cure with this condition, urinary infection must be eradicated. This includes the search for and thorough relief from all focal infections.

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BIBLIOGRAPHY

1. Civiali: Quoted from Kreisel and Gehl. Illinois Medical Journal, May, 1920.
2. Lilienfeld: Quoted from M. Lavandera. Surgery, Gynecology & Obstetrics, Volume 1, February, 1920.
3. L. Wolff: Quoted from Kreisel and Gehl. Illinois Medical Journal, May, 1920.
4. M. Lavandera: Surgery, Gynecology & Obstetries, Volume 32, February, 1920.
5. Smith: Transaction Pathological Society of London, 1863, Volume 14, Page 185.
6. F. Kreisel and W. H. Gehl: Illinois Medical Journal, Volume 37, May, 1920.
7. Pollet: Journal d'Urologie. Paris. January, 1921. Volume 11, No. 1, Page 15. Abstracted in the J. A. M. A. May 7th, 1921, Volume 76, No. 19, Page 1324.

COMPLICATIONS OF PROSTRATECTOMY*

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In the Mayo Clinic complications of prostatectomy occur almost exclusively in the treatment of benign hypertrophy since, if a clinical diagnosis of carcinoma of the prostate is made, the disease is usually treated by other than surgical means. The complications are not confined to those due to removal of the prostate, but include the renal disturbances produced by enlargement of the gland, and the operative and postoperative complications.

Adenomatous hypertrophy of the prostate causes a much larger percentage of cases of obstruction at the neck of the bladder than chronic diffuse prostatitis, usually with adenomatous hypertrophy. However, the type of gland or its degree of enlargement bears no definite relation to the amount of disturbance it may produce. A moderately enlarged gland may produce more mechanical interference with emptying of the bladder than a huge

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intravesical prostate, and usually not until this mechanical interference occurs do vesical symptoms appear. The subsequent renal insufficiency and retention of urea bear direct relation to the amount of residual urine and infection. The uremia is actual or potential, depending on the amount of residual urine and consequent infection. Its recognition and treatment before operation have been entirely responsible for the infrequency of postoperative uremia at present, contrasted with its frequency in past years when the patient was subjected to prostatectomy without preparation. The means and indications for the preliminary treatment in these cases have been published recently.[1] If the residual urine exceeds 2 ounces the patient is subjected to preliminary drainage of the bladder by urethral or suprapubic catheter until his general condition, renal function, and urea elimination approximate the normal.

The operative and postoperative complications of prostatectomy have been materially minimized with the increased popularity of the suprapubic open operation. Vesical diverticula and stones are so often associated with benign hypertrophy that their recognition and treatment simultaneously or subsequently are important in order to bring about normal function of the bladder. The frequency of these associated lesions should discourage the blind enucleation of the prostate through a small suprapubic incision, which admits only the finger, or through a dilated suprapubic sinus of a primary drainage operation. Exposure is as important in surgery of the prostate as in other fields of surgery. It is true that in an effort to perform an open operation, particularly by the two-stage method, prostatectomy preceded by preliminary suprapubic drainage, the peritoneal cavity occasionally is opened accidently. The reflexion of the peritoneum from the anterior abdominal wall on to the bladder is quite variable; at times it is high on the fundus and occasionally low toward the pubis near the bladder neck. This occasional low reflexion of the peritoneum presents dangers in preliminary stab suprapubic drainage and blind enucleation of the prostate which are not obviated entirely by distending the bladder with fluid or air. We have observed extreme distention of the bladder in cases with acute and chronic retention in which the fundus of the bladder at the level of the umbilicus failed to carry the peritoneal reflexion sufficiently above the pubis to avoid transperitoneal entrance to the bladder. By incising down to the bladder the peritoneum can be stripped back and the trocar introduced extraperitoneally when a simple drainage is desired. When the distended bladder returns to its normal size after drainage the peritoneal fold often drops down around the suprapubic sinus, which increases the liability of its being opened at the time of the second-stage operation or of removal of the prostate by excision of the sinus and open exposure of the bladder, but we have not observed peritonitis or any ill effects when the peritoneum has been closed immediately. The danger lies in failing to recognize that the peritoneum has been opened, and in allowing postoperatively urine from a bladder, in which there is practically always a variable amount of cystitis and infection, to drain into the peritoneal cavity.

Operative and postoperative hemorrhage have been responsible for a large number of deaths following prostatectomy. The open operation affords accurate control of the operative hemorrhage and has decreased materially the incidence of immediate postoperative hemorrhage. Most of the bleeding after enucleation of the prostate occurs at the neck of the bladder and can be controlled accurately by interrupted sutures. Bleeding from the capsule of the prostate should be controlled by a gauze pack, or bag, or by other means, since the patients cannot stand the loss of blood.

The age, renal insufficiency, cardiovascular changes, and so forth, in patients with prostatic hypertrophy are factors which produce the narrow operative safety zone, and it is conceded that the least amount of operating necessary to remove the mechanical obstruction at the vesical neck is desirable. This has led to the quick blind enucleation which requires only a few minutes and a small amount of anesthesia, but which affords no means of controlling the bleeding that in some instances is very profuse, and even causes death.

Frequently multiple small diverticula coexist with benign hypertrophy in a markedly trabeculated bladder and usually are of no consequence. The diverticulum of an ounce or more capacity must usually be dealt with surgically. Diverticula have been overlooked frequently, and in many such cases the oversight has been responsible for incomplete relief after prostatectomy. The growing incidence of diverticula has been explained by cystoscopy and the open suprapubic operation, and their treatment has increased the percentage of satisfactory results from prostatectomy.

Vesical stones associated with prostatic hypertrophy often present a definite complication. While the removal of a stone at the time of prostatectomy does not add to the difficulty of the operation, the presence of single or multiple stones and the associated cystitis are responsible for the renal insufficiency which may be so serious as to contraindicate prostatectomy at the same time. Usually the residual urine and the resultant infection of

the urinary tract are sufficient to require preliminary drainage of the bladder, which almost always must be suprapubic, because a urethral catheter is seldom tolerated in the presence of vesical stones. Consequently under these unfavorable conditions removal of the prostate at the time of cystostomy for removal of the calculus has been accompanied by a higher mortality rate than has enucleation of the gland several weeks subsequent to the removal of the stone and drainage of the bladder.

The frequency of cardiac and pulmonary complications of patients with prostatic hypertrophy is diminished by the preliminary treatment and the proper selection of the anesthetic. Most patients with benign prostatic hypertrophy can be operated on safely under ether anesthesia, but if cardiac or pulmonary lesions exist, combined sacral and abdominal infiltration or spinal anesthesia is indicated. Complete relaxation and anesthesia are obtained by either method, so that the open operation may be performed with practically a negligible risk from the anesthetic.

Postoperative Complications: Postoperative pulmonary complications are infrequent, largely because the patients are kept in bed a short time. Death from pulmonary embolism is rare.

Postoperative uremia, of interest on account of its present relative infrequency contrasted with its frequency before the value of preliminary drainage of the bladder was recognized, develops only in patients in whom back pressure in the kidneys and severe infection have caused so much renal damage that it cannot be repaired entirely by bladder drainage. Most of these patients, however, improve so much after drainage of the bladder that when symptoms of uremia occur they usually respond to maintenance of the body fluids and elimination.

Hemorrhage immediately following operation is usually of little concern when an open operation has been performed and the hemorrhage has been controlled during operation. Late or secondary hemorrhage occurs occasionally and at times is profuse. It is often caused by catheter manipulation, and is best controlled by removing all catheters and avoiding vesical irrigations. In some instances transfusion is necessary. Hemorrhage postoperatively lowers the resistance to infection, and usually is followed by diminished urinary output, with increased liability to uremia, and sometimes by temporary complete suppression of urine. The incidence of postoperative hemorrhage can be minimized by avoiding postoperative irrigations of the bladder and unnecessary manipulation of the drainage tubes.

Infection is always a source of great concern during the convalescence. Cystitis usually is associated with any amount of residual urine, and a consequent pyelonephritis may be severe. Drainage of the bladder accomplishes much in the reduction of the infection in the urinary tract, but there is always a variable amount of cystitis in all cases that come to operation, and the infection is immediately disseminated to the paravesical space when the bladder is opened. To open the bladder which is distended with urine or which has been filled with water just before operation increases the liability to paravesical infection by flooding the operative field with infective fluid, and has been responsible for severe infections in the space of Retzius and the sloughing wounds, which are obviated largely by emptying the bladder with a urethral catheter immediately before the operation, instituting thorough drainage of the space, and making a moderately loose closure of the abdominal wall.

Epididymitis may occur with prostatic hypertrophy, not necessarily after operation, but often during the period of preliminary preparation. Its incidence is higher in patients who are subjected to intermittent or permanent drainage of the bladder by urethral catheter before operation and in patients in whom a urethral catheter is used postoperatively. The greatest care in cleanliness, in introducing catheters, in using instruments under aseptic conditions, and isolating the patient with epididymitis has decreased the incidence of this complication very materially.

The internal sphincter at the vesical neck ceases to functionate as a sphincter when it is dilated by intravesical enlargement of the prostate and allows the bladder and prostatic urethra to become a continuous cavity with the ejaculatory ducts, emptying into it at the verumontanum just above the external sphincter muscle. The same condition exists after removal of the prostate. The introduction preoperatively of a urethral catheter into the bladder in the presence of cystitis and infected urine in the prostatic urethra and its introduction postoperatively in the presence of infected urine in the prostatic capsule favor the extension of infection to the epididymis by way of the ejaculatory duct, seminal vesicle, and vas. The infection may be bilateral or unilateral. It was bilateral in nearly a fourth of the patients in the Clinic in whom it occurred; when unilateral, it occurred with equal frequency on each side. Usually infection in the epididymis does not proceed to suppuration, but occasionally incision and drainage are necessary, and in some instances recovery has not occurred until castration has been performed.

A persistent suprapubic sinus is usually due to incomplete removal of the obstructing prostate, a transverse bar at the neck of the bladder, stricture of the prostatic urethra, a

large diverticulum which has been overlooked, or the use of nonabsorbable suture material. Enucleation of a large intra-urethral prostate at times leaves a transverse bar posteriorly at the bladder neck, between the bladder and prostatic urethra, which interferes with complete emptying of the bladder by urethra. This bar can be eliminated readily as soon as the prostate has been enucleated, by making a V incision of the bar back into the trigone, as described by Walker.

Even though the entire prostate is enucleated, remnants of the prostatic capsule may be left if a blind operation is performed, and, when the vesical neck contracts subsequently, produce obstruction by ball-valve action at the urethral orifice. Why large diverticula should retard or interfere with the closure of the suprapubic sinus is difficult to explain, but cases have been observed in which no other cause could be found, and closure of the sinus has occurred after removal of the diverticulum. Stricture of the prostatic urethra, even when its entire circumference has been removed, is rare, but it occasionally occurs and requires dilatation. The open operation of prostatectomy affords the opportunity of accuracy which eliminates the possibility of incomplete removal of the prostate and oversight of a diverticulum or of a transverse bar formed by the neck of the bladder and the prostatic capsule.

I have referred to infection of the genitourinary tract only. General sepsis occasionally occurs when the prostatectomy has been performed in the presence of a great deal of local infection, but probably the most common cause is the indiscriminate use of the urethral catheter postoperatively in an attempt to close the suprapubic sinus. The prostatic capsule during the first two or three weeks after operation is an infected granulating surface. A urethral catheter carefully introduced without trauma to the prostatic capsule during this period is usually harmless, and its use hastens closure of the suprapubic sinus. However, when difficulty is encountered in passing the catheter, the prostatic capsule may be traumatized severely; the infection may be disseminated into the blood stream, and general sepsis produced. Empyema, suppurative arthritis, meningitis, and so forth may develop.

In order to reduce the complications attending the surgical treatment of hypertrophy of the prostate the following points should be emphasized:

1. The preliminary preparation of patients with prostatic hypertrophy improves their general condition, increases the renal function, reduces infection, and decreases the liability to postoperative uremia.

2. The open suprapubic technic enables the surgeon to perform an accurate operation under the eye, to control bleeding, and to deal with coexisting lesions of the bladder.

BIBLIOGRAPHY

1. Hunt, V. C.: Benign hypertrophy of the prostate. Journal-Lancet, 1920, xl, 267-273.
2. Walker, J. W. T.: Hæmorrhage and post-operative obstruction in suprapubic prostatectomy; an open operation for their prevention. Brit. Jour. Surg., 1920, vii, 525-536.

DISCUSSION

DR. FRANKLIN R. WRIGHT, Minneapolis: The subject Dr. Hunt has chosen is such a large and important one that, instead of limiting my remarks simply to what he has said, what I shall say may be considered rather supplementary to his paper.

The complications of prostatectomy divide themselves naturally into three groups, those which occur at the time of operation, those which immediately follow operation, and those which take place during healing. Those which take place at the time of operation are the accidental opening of the peritoneum and should be taken care of before the bladder is opened, and then they are harmless. The other complication that takes place at the time of the operation is hemorrhage, which occurs from two places, either from the mucous membrane lining the bladder, or from the covering of the postatic tumor when that is superficial, or from any attempts to enucleate the tumor from the prostatic sheath we may accidentally puncture the prostatic sheath, opening the pelvic plexuses, and then we will have hemorrhage. When this accident does occur, these patients practically all die. They all practically die because the wound must be packed. You cannot get in there to control the hemorrhage. The man's bladder is septic to start with, and while you may attempt to pack the wound in order to control hemorrhage, the hemorrhage occurs in a septic wound, and invariably the sepsis is so great in these cases that they die on the fifth or sixth day. I have had this accident twice, once in a patient with nonseptic bladder, and once in a patient with a septic bladder, who died on the fifth day from sepsis.

The other complication is hemorrhage coming from the superficial membrane. This we can get at and control by ligation.

As to uremia immediately following prostatectomy, the principal thing is to remember first the preliminary preparation, which should be long enough so that a man can go with an empty bladder for several days before he is operated on. I have had men die under my care who previously were in perfect health; they had perfectly clear urine; they had 600 c. c. of residual urine, and yet died of uremia because the bladder was emptied too rapidly. One of these patients was simply catheterized and died of uremia. The first indication of uremia coming on is manifested by dryness of the tongue, and this will be noticed twenty-four or forty-eight hours before the patient gets any noticeable symptoms you can discover, immediately following operation.

I had a case recently of acute gastric dilatation the same as you would have following abdominal work.

Dr. Hunt in giving his statistics referred to epididymitis as occurring in 50 per cent of the cases. To me this high percentage is rather appaliing, as I find in my cases it does not amount to 5 or 7 per cent. I do not know the reason for this except that the indwelling catheter is too often used. In these cases where we have sepsis the posterior urethra is more or less involved and there is injury to the sphincter which controls the seminal vesicles and vas deferens as in the mucous membrane of the posterior urethra. The method by which infection of the epididymis takes place is peculiar. It comes from injury to the epididymis or testicle. A slight blow on the testicle or epididymis causes a reverse peristalsis in the epididymis carrying the infection from the posterior wall of the urethra into the epididymis. In these cases we have obstruction in the process of healing, and when the tumor is enucleated the prostate will contract down almost like a pregnant uterus. The entire mucous membrane of the posterior urethra is always torn off. This contracts like a hollow tube. If the posterior urethra is lined with granulation tissue, during the healing process the epithelium runs through the muscle ends, possibly from the calix from the bladder end, and the mucous membrane is drawn down into the posterior urethra to represent a funnel. I have seen cases in which the lining has furnished me new mucous membrane for the posterior urethra. I have had five cases in which, instead of drawing down the posterior urethra, this funnel has furnished new mucous membrane. The mucous membrane is drawn right straight across the urethra as a diaphragm, so that when you introduce the catheter to its full length you meet with resistance. I have operated on three of these cases on whom I had done the primary operation, and I have operated on two that were operated on by other men, in one of which, according to the diagnosis, it was not right to operate.

DR. G. J. THOMAS, Minneapolis: I think the present low mortality in prostatectomy is largely due to our preliminary preparation and our attempt to diagnose and overcome the complications. The complications are first, urinary retention; second, hemorrhage; third, infection. At the present time I think it necessary to cystoscope the majority of individuals complaining of the usual symptoms of prostatic hypertrophy so that compilcations can be diagnosed and properly treated. The cystoscope is of definite value in these cases, in addition of course to rectal palpation, to determine the presence or absence of an obstructing prostate, of stone, of diverticulum, of relaxation and etc. I have seen many patients who had symptoms typical of prostatic obstruction and who had a palpable prostate per rectum, but who on cystoscopic examination were found not to have an obstructing prostate that interfered with an outflow of urine. Some of these individuals had the usual relaxation which accompanies tabes; others had a small bar which does not always require operation, but which can be removed by fulguration or by punch. The cystoscope will reveal the condition of the bladder, whether it contains a stone or a diverticulum, the grade of inflammation, etc. The X-ray also should be used. By this method the diagnosis of bladder, ureter or kidney stone can be made. Frequently stones in the bladder and kidney are found complicating enlarged prostate.

Preliminary preparation is necessary before an operation for the removal of the prostate in all individuals who have more than two ounces of residual urine, or who have an infected urine. When the patient requires preparation other than frequent catheterization to rid him of his residual urine I much prefer suprapubic drainage. This should be carefully done under local or gas anaesthesia. An incision should be made so that the peritoneum can be pushed out of the way and so that the opening into the bladder can be made as high as possible. I prefer a large tube which can be stitched into the bladder to prevent leakage. I also try to sew the bladder to the abdominal wall so that the peritoneum will be less likely to become adherent to the fistuous tract and thus become troublesome when the prostatectomy is being done. When an indwelling urethral catheter is used many complications which are troublesome may arise, as epididymitis, peri-urethral abscess, prostatitis, etc.

Many surgeons do not decompress the kidneys suddenly, that is, they do not remove a large amount of residual urine at one time as they fear collapse of the patient and hemorrhage from the kidneys. They prefer to remove small amounts of urine repeatedly. I have never seen worse results or complications occur when removing all residual urine than when removing small amounts. In my opinion relaxation of pressure in itself has little to do with symptoms which frequently follow the removal of residual urine. I do think that infection after such manipulation is the cause of the patient's symptoms which may some times end in death.

The worst complication that one has to look for in prostatic surgery is hemorrhage. This can be controlled, as Dr. Hunt very nicely describes, by a complete exposure of the bladder by stitching of the torn ends of the bladder mucose and prostatic capsule together with gauze pack within the capsule.

DR. HUGH CABOT, Ann Arbor, Michigan: I am exceedingly glad to get into this discussion; my only difficulty is how I should stay out. The modern situation in prostatectomy is the result of an attempt to produce safety first. In other words, to make the operation fool-proof, and as Dr. Hunt has outlined, the plan which they carry out, which is now almost universal, has succeeded in making the operation fool-proof.

The great mortality in the past was due largely to the fact that we expected of these patients an amount of resistance to trauma which no group of patients would have satisfactorily stood. What did we do? Many of you did what I did. We opened the obstructed bladder; we decompressed the kidney which had been working against obstruction for

months or years, and we created a surgical wound which was the nicest possible method of infecting the patient. In other words, we punched him three times in the same place. We robbed him of his kidney function by decompressing his kidney; we gave him an infected wound in the prostate, and expected him to get well. Curiously enough, he did not do it.

The most important thing we have to do in the preliminary treatment which, after all, is the key to the situation, is the production of a temporary immunity. Many of these patients, though they have had infected urine and infected kidneys, are still quite capable of getting another one. We see in these cases a reinfection of the kidney. In other words, their immunity to the infection, which is apparently generally a colon bacillus infection, is not sufficient. Whatever else we do in the preliminary drainage we must be sure the kidneys have sufficient protection.

I have long believed the greatest cause of death, after a properly planned operation, was bleeding. These patients do not die of hemorrhage. The number of patients any one of us have seen die of hemorrhage is negligible. It is said they die of sepsis, of uremia, of pneumonia. They do not do anything of the kind. They die of hemorrhage, by which I mean that we reduce their resistance by depriving them of their blood volume and circulating medium to a point where they are quite incapable of resisting the dangers to which they are exposed, and they die of any one of a dozen things.

I do not at the present time do the open operation with suture. I am not sure that I was not the first person that did it, and I did it for a considerable time but I have come to believe that I get equally good results without it.

The control of hemorrhage can be satisfactorily achieved by the use of the Hagner bag, and there are very few cases in which that does not give you a really dry bladder.

For general purposes in this operation, as in any operation, simplification of the technic is important, and I have doubt as to whether the open dissecting operation will remain. It seems to me unnecessarily complicated. I believe we can get the same results in other ways, and if that be true, we shall go in this department of surgery as in others from the phase of complication to the phase of simplification. I do not think it is true that one cannot deal with the complications found in the bladder, or cannot discover them satisfactorily without a wide open operation. The discovery of diverticula in the bladder does not require wide opening of the bladder. You can see with the cystoscope diverticula which you find with the greatest difficulty with the bladder open. The finding of stones does not require a wide exposure. It seems to me that the results I am getting by the enucleation operation are superior to those I got by wide open dissection. On the other hand, the improved technic of Dr. Judd has produced a much more perfect operation than the one which I employed. It is a wonderful piece of surgical technic. The whole question will turn on whether we can simplify the operation and do all necessary work without so much of an exposure.

DR. R. E. FARR, Minneapolis: I want to refer again to the proposition of negative intra-abdominal pressure, to visual examination of things, and to instrument dissection. It is gratifying to see surgeons more generally appreciating the fact that a good exposure makes it possible to do a better operation. If there is any place on a patient, who is severely handicapped, that you can do an operation by this plan, it is enucleation of the prostate. We have patient after patient with a pulse never going above 75 from the time they enter the hospital until they leave, unless there is infection or some complication. I refer to the 4-ounce caudal procain injection, suprapubic infiltration, opening the abdomen withou pain and opening the bladder wihout pain. Using a mild spring retractor and the Trendelenburg position the bladder will balloon, it will hang in its normal position and the intestines will drop out of the pelvis so that anybody can look at the prostate without introducing the finger into the rectum or using an instrument.

In Surgery, Gynecology & Obstetrics I have recently described a modification of Young's Retractor, which goes into the internal urethra. It is a much better instrument for prostatic work than any I have previously used. I have photographs of old men smiling, with the prostate still in situ but showing above the abdominal wall. With this instrument one can lift the prostrate out, in many cases, and remove it in much the same manner one would remove tuberculous glands of the neck.

DR. HUNT (closing the discussion): Because of the kind consideration I have received at the hands of those who have discussed the paper, there is very little to say further on the subject.

What has caused us to employ the open exposure in the one-stage operation, and in the vast majority of cases of the two-stage operation is that we often do a preliminary suprapubic drainage, which in some instances is not accompanied by exploration of the bladder on account of the poor condition of the patient. To do the second stage as a blind enucleation accounts for the occasional oversight of a diverticulum. While with the cystoscope a great many of these diverticula have been diagnosed and have been recognized, occasionally they are not recognized by cystoscopic examination. However, there is the argument which Doctor Cabot brings forth, namely, the least amount of operating we can do to enucleate the prostate the better are the chances of recovery for the man who is potentially uremic. Recognition of the fact that men with prostatic hypertrophy, particularly if there has been any amount of residual urine, are potentially uremic, and that their treatment before operation has been responsible for the diminished operative death rate.

SOME ESSENTIAL POINTS IN THE TREATMENT OF INFANTILE PARALYSIS*

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Infantile paralysis formerly was, and in some localities still is, called acute anterior poliomyelitis. The name owes its origin to the belief that the virus involved only the anterior horn cells of the spinal cord, thus giving rise to the motor paralysis of a more or less localized area. Advanced pathological and clinical studies have shown that not only the anterior cells but the posterior and even the white matter as well are involved. It becomes necessary, therefore, to revise the name and the one generally accepted is acute poliomyelitis. Essential paralysis of children, likewise has given way to the broader term, as adults as well as children become victims.

Draper, in his excellent little book entitled "Acute Poliomyelitis," has given us a comprehensive but brief description of the history of the disease. He says that the first observations on the disease in its clinical aspect were probably made by Underwood as early as 1774. He pointed out that children might suddenly become paralyzed after a brief illness. Sixty years later Badham, an English physician, called attention to the fact that a group of children in one locality might develop paralysis after a short acute sickness; thus calling attention to the epidemic tendency of the disease. But the first systematic clinical picture was drawn by Jacob von Heine in 1840. Von Heine was an orthopedic surgeon and his experience with many paralyzed children led him to investigate the original cause. This disclosed the fact that there was an initial sickness attended by a febrile reaction and this at times was so slight as to escape the notice of even the parents. The paralysis usually followed the acute illness after a few days. Strumpell in Vienna, was the next writer about 1884. In 1889, Medin described the then prevailing epidemic in Sweden. He pointed out that the condition was an acute general infection, quite frequently not attended by paralysis. Silence next until 1905 when Wickman described another great epidemic in Sweden. He called the type of acute infection, not giving rise to paralysis, an abortive type. This probably was a misnomer as we now regard the paralysis as a sequel and complication of the acute infection rather than as the disease per se. In 1907 Strauss pointed out the fact that the lymphatic tissues throughout the body were involved.

Experimentally, Landsteiner and Popper, in Vienna, were able to produce the paralysis in monkeys as early as 1909, but they were unable to transfer the virus from one monkey to another. This remained for Flexner and Lewis to accomplish a few months later in this country.

In 1914 Flexner and Noguchi published reports of the cultivation and isolation of an organism that seemed to be constantly associated with infantile paralysis. I believe that there is still considerable controversy over the identity of this organism.

The type of individual that is most susceptible to the disease, according to Draper, is the large, well developed child with a broad forehead and a broad round face. The teeth are often widely spaced, especially the central incisors. Among adults and adolescents the robust type is not the rule. Especially among the fatal cases one finds a more delicate individual.

The most susceptible age is the first decade. The greatest number of cases occur between one and six, although no age seems immune. One victim sixty years of age was reported here in Duluth by Dr. Fahey. Boys are slightly more susceptible than girls.

Turning to our pathological findings we get our first clue as to why the initial paralysis is always the greatest. On opening the skull of a patient dead of poliomyelitis one finds the meninges injected and swollen. There is a bulging of the gray matter on section. The ganglion cells are swollen. The microscope reveals a small, round cell infiltration about the horn cells both anterior and posterior. The pressure of this infitration causes the initial paralysis and as it is relieved the paralysis clears up. Any permanent paralysis is due to the destruction of the horn cells, either from pressure necrosis or direct toxic effect of the virus or both. Aside from the condition pres-

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ent in the brain there is a general lymphatic hyperplasia.

The symptoms of acute poliomyelitis may be very vague with mild drowsiness and slight fever. Paralysis may or may not follow. The typical picture, however, is somewhat different. The child may complain first of headache. There is usually some soreness of the throat. He soon ceases his play and lies down. He does not want to be disturbed. The temperature may be as high as 103° or 104°. There may be gastric disturbances with nausea and vomiting. Probably the most characteristic clinical sign is the resentment displayed by the patient when even the mother attempts to move or even touch it. The resentment may take the form of a whining complaint almost dog-like in character. How different this picture is from the usual desire of the child to be held and his discomfort relieved by the mother-touch! This point has been stressed many times by observers who have had opportunity to see a large number of acute cases. The explanation is found in the fact that any movement of the spine impinges on the swollen ganglion cells. To prevent this the child lies with his chin tilted up and the spine rigid or slightly concave dorsally. The position often approaches opisthotonos. There may be a slight intermission in the fever before the paralysis appears. At this time there is usually a varying degree of tenderness in the muscles increasing up to the point of paralysis.

Early during the first few hours the spinal fluid is usually clear and escapes under slightly increased pressure. The globulin is slightly positive but there is little change in the cellular content. When signs of meningial involvement commence the cell count usually increases and may be as high as 1500 to 2000 cells per cubic millimeter.

Regarding the prognosis one must be quite conservative. Mortality may be as low as ten per cent or as high as twenty-five. Many of the deaths are due to paralysis of the respiratory muscles. Baer feels that the mortality can be lessened by the use of the pulmotor when respiratory failure is imminent. He reports one child that was kept alive four days by this method and the end came through failure to secure a new supply of ogygen promptly enough. As to the paralysis the outlook is somewhat more favorable after the early administration of immune serum. In monkeys the paralysis can be prevented by injecting the serum immediately after innoculating with the virus.

Treatment is divided into three stages—the acute, the convalescent and the chronic. The first covers a period of a few days to six weeks. The second extends from the end of the first stage through a period of about two years. The last stage begins when there is no longer any hope of spontaneous recovery and should continue as long as the patient needs any attention.

During the acute stage one resorts to the early use of serum and attempts to relieve the pain in the tender muscles and prevent deformity. The serum should be given both intravenously and intraspinally. First and foremost we are dealing with a systemic infection; hence the need for the intravenous injection. The intraspinous treatment should be given at the earliest indication of involvement of the central nervous system. The serum that has been found most effective has been that obtained from patients recovered from polio from five months to five years.

One of the distressing features of the disease is the pain and the tenderness in the muscles that are involved and the fear of being moved. There is danger of deformity formation. This is best treated, perhaps, by the use of the so-called plaster bed. The plaster bed is made by wrapping the child in sheet-wadding from head to foot and then applying a plaster cast with all of the joints in a position of least deformity. The cast is then bisected and the front half removed, leaving the lower half for the child to lie in. When it is necessary to move the patient this can be done with no discomfort to the child by simply lifting the lower plaster shell with the child. Where only a leg or an arm is involved the plaster bed is not necessary.

When there is danger of respiratory failure one should use the pulmotor as mentioned before. It may be necessary to continue its use for several days but one is spurred on by the knowledge that the paralysis often clears up rapidly. The fleeting facial involvement often seen is an example.

The second stage begins when the tender-

ness has left the muscles. From this time forward there should be the greatest care taken to prevent deformity and to guard against over-stretching of weakened muscles. The muscle tone and muscle nutrition must be closely watched and every effort made to improve same. Muscle training also belongs to this stage. No one can tell at this time which muscles will recover and which will not. Even those that show the electrical reaction of degeneration have been known to recover while some that have not shown this reaction never function again.

Taking up first the task of preventing the over-stretching of weakened muscles, I should like to lay heavy emphasis on the danger of neglecting this phase. It is, of course, a well known fact that the more highly specialized a cell is the harder it is for nature to rebuild it. Muscle cells are quite highly specialized. We are dealing, not alone with a muscle whose nerve supply is diminished or gone, but also with one whose nutrition is impoverished and whose circulation is very sluggish. One has but to look at the edematous, cyanotic extremity of a polio case to realize how true this is. How easy, then, to injure cells in this condition! Therefore one of the first necessities is to protect a weak muscle from its strong antagonist. If we have a weak tibialis anticus and peroneus tertius opposed by a strong gastrocnemius and soleus, a right-angle brace or cast should be prescribed to be worn both night and day. If one keeps the brace on during the day but allows the foot to drop down into equinus during the night, all the beneficial effects of the day are lost during the night. If the erector spini group is weak, the patient should not be allowed to sit without a body cast or an efficient brace to support the back. Lovett has shown through his method of measuring muscle strength that a denervated muscle tires very quickly and that later attempts at function are nowhere near as effective after this fatigue has been allowed to develop; hence we must be very particular to prevent stretching of and injury to the stricken parts.

Thus far I have spoken of preventing injury to muscles per se. Let me indicate the difficulties attendant upon unprotected joints. Let us return to a supposed case of muscles paralyzed on the anterior portion of the lower leg while the posterior muscles are strong. The foot, of course, is pulled into equinus and as this is not corrected the tendo-achilles gradually shortens and it becomes impossible to bear weight on such a foot—the weight must be borne by the toes if at all. Suppose the hamstrings are strong and the quadriceps weak or gone. The knee must needs flex and the hamstrings will contract until it is impossible to obtain full extension at the knee. Another most common deformity is met with in the hips. Patients that cannot walk are allowed to sit all day in a chair or on the bed. This allows the tensor femoris and sartorius to contract and soon full extension at the hips is impossible. Scoliosis is also very common. In these cases before any brace can be applied or any walking done these contractures must be overcome, either by stretching under anesthesia or by tendon-lengthening or straight tenotomy. Of course valuable time is lost and it is impossible for any power to return to the weakened muscles when they are stretched to the utmost of their capacity. I realize quite fully that these matters which I have been pointing out seem simple and obvious but it is the simple and obvious thing that we are very apt to overlook.

Our next concern is the preservation of muscle nutrition and muscle tone, in so far as we are able. Probably the best way to do this is by gentle and frequent massage. This should be done by one who has been trained in the science of massage and should not be undertaken until all muscle tenderness has disappeared. Electricity has been used quite extensively for this purpose and still is by some but the general feeling in the big clinics is that the massage is just as effective and in most instances, more so. Sir Robert Jones of Liverpool says, "If electricity is desired the constant current can be used, but its advantages cannot be compared with those of posture, massage and exercise." The massage should be continued during the first year.

Muscle training is becoming a very important aid in the latter part of the convalescent period. It is being advocated very enthusiastically by Lovett, in Boston. It consists in encouraging the patient to concentrate on one simple motion and develop control of movement. As this is gained the movement is per-

formed under gradually increasing resistance. With very young patients this treatment is rather difficult, but by first frequently carrying out the movement passively, the child can be encouraged to voluntarily imitate. Lovett devotes a whole chapter in his book, "The Orthopedic Treatment of Infantile Paralysis," to the discussion of muscle training. It requires considerable time and patience, but in his hands the results have been very gratifying.

The last stage—the so-called chronic stage—is the operative and brace stage. No operative procedure should be carried out in less than two and better three years. Up to this time there is a possibility of some of the paralyzed muscles regaining some power. If we were to do a muscle transplantation to a paralyzed part and then the paralyzed muscle should regain function, you can readily see that our deformity would go in the opposite direction and would be as bad as the original one.

On general principles a leg that can be made self supporting is much to be desired to one that is dependent upon a brace. A brace has to go to the repair shop every so often, whereas a functioning leg has an every present master mechanic—nature. A foot that is entirely flaccid can be made self supporting by performing the Whitman operation of astragalectomy. This operation gives one a stable foot that is capable of weight bearing without any additional support. It does make the leg somewhat shorter than its fellow but this can be readily compensated for by putting an elevation on the sole and heel of the shoe. A knee can be made self supporting by doing a resection, but this should never be done before the patient has reached adult life. It is well nigh impossible to do a resection of the knee without injuring the epiphyseal portion of the tibia and femur. When this happens, of course, the leg will no longer grow in length. Therefore it is necessary to wait until a child has grown as much as it will before a resection is contemplated.

A discussion of tendon transplantations to restore the balance of power about joints would carry us too far afield. Suffice it to say that the present day orthopedist, in order to justify his title, must be a surgeon as well as a mechanic. Living up to this standard has improved the success of tendon transfers which failed before. There is one point, however, which I should like to mention in this connection. Bennett says that in performing a tendon transplant about the foot if it is combined with the Gallie method of implanting the paralyzed tendon into the tibia the percentage of successes will be greatly increased. I have had occasion to observe several of his cases treated in this manner and can vouch for the truth of the statement.

Cases that cannot be made self supporting by operation or muscle training must depend on braces and crutches.

In summarizing the treatment let me emphasize the following:

1. The early use of immune serum both intravenously and intraspinally.

2. A cast or brace should be used to prevent stretching of paralyzed muscles, to relieve the acute tenderness and to prevent deformity. Remember that the appliance should be worn during the night as well as during the day. Any overstretching is injurious.

3. Massage seems to be the best method of promoting muscle nutrition and muscle tone; it also improves the circulation.

4. Muscle training is proving more and more useful, both in the convalescent and chronic stages.

5. Operations should not be performed under two years and resections should not be done before adult life is reached.

BIBLIOGRAPHY

Draper: Acute poliomyelitis. P. Blakiston's Son and Co., Philadelphia, 1917.

Lovett: The orthopedic treatment of infantile paralysis. P. Blakiston's Son & Co.

Baer: Unpublished lectures to fourth year medical students Johns Hopkins Medical School, 1917.

Bennett: Same as above.

Jones, Robert: Infantile Paralysis, Brit. Med. Jour., May 30, 1914.

THE TREATMENT OF SYPHILIS.*

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My specific patients invariably ask the following questions at their first consultation: "What is the matter with me? Can I be cured?" and "What must I do?"

Diagnosis then comes first and before one pronounces a person syphilitic one must know

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it to be true or a great injustice is done. One must also make the diagnosis as soon as possible.

"Can I be cured?" depends largely on our criteria of cure, the progress the disease has made in time, the lesions present and other known or unknown factors. Possibly the only absolute criterion of cure is when the patient contracts the disease a second time.

"What must I do?" is answered by our knowledge of the disease and of the value of our therapeutic efforts and the art of their proper use.

Not all my luetic patients consult me in the initial stage of the disease, but most patients consult some one at that time and a definite diagnosis is not always made when it should be. This last is unfortunate as I firmly believe that the time to cure syphilis, if an absolute cure is possible (and I believe it is in many instances) is in the early primary stage of the disease. At this stage the diagnosis may be made by our clinical knowledge and experience with the disease and confirmed definitely by the finding of the treponema pallidum in the serum of the primary lesion. The Wassermann test at this time is of little value or importance and the delay of a day or two necessary for the performance of the test may mean ineffective therapy and many more days of treatment.

We will assume the diagnosis is made at this time. Then make as thorough an examination as you can of the patient's general condition, as it may influence your treatment, because you are going to use powerful drugs which may cause undesirable reactions. If satisfied that the patient's condition is good, begin treatment with arsphenamine (or its modifications) and mercury and administer them early and often.

Several injections of arsphenamine (not any of its worthless substitutes) either combined or followed by mercury will accomplish more at this time and with less danger of undesirable reactions than much more therapy at a later date. Treatment at this time is often curative while treatment later may be just treatment.

Arsphenamine is a spirillocide and is preferably given by the intravenous route. The subcutanious, intramuscular and rectal administrations are undesirable. The intraspinous administration of arsphenamine or of asspheminized serum has never been advocated at this stage of the disease and is illogical and unnecessary and inadmissible at any stage of the disease. It is simply a more difficult and more expensive way of doing a relatively simple thing. The dose given is too small to be efficient and the drug when so given does not reach the essentially nervous tissue.

Mercury is best employed by injections (most efficient when intravenous) or inunctions. I do not go so far as to say that given by mouth it is useless, as some would have us believe, but it is certainly less efficient when so given and often has disadvantages overshadowing the simplicity of administration. Mercury, unlike arsphenamine, probably acts on the body cells that have been functionally changed by the poison of the disease, the toxin producing an inversion of the lipoid metabolism of the organism. I might say here that the detection of this inverted lipoid metabolism may occur in conditions other than syphilis. Various forms of mercury may be employed; all are efficient but some have preference because of their solubility or insolubility or non-irritating effects, etc., according to their mode of application.

The combined arsphenamine and mercurial treatment, then, is scientific and confirms the practice generally followed by clinicians. With arsphenamine we try to exterminate the infection and with mercury restore the function of the body cells.

Iodine is of great value in causing the disappearance of many lesions of the later stages of the disease; while not regarded as of the same specific value as arsphenamine or mercury its effects are sometimes marvelous. None of the many preparations of iodine have any advantage over potassium or sodium iodide. Given by the mouth the drug is as therapeutically active as any other method of administration.

The treatment of the luetic in the secondary and later stages of the disease is similar to that of the initial stage, only more prolonged and perhaps less energetic unless the involvement of some special organ is grave enough to require immediate relief. Treatment, here, is less efficient and the chances of untoward reactions from the drugs employed, especially arsphenamine, are increased, as the tissues are saturated with the infecting agent and undermined by the disease. Unfortunately many of the undesirable

effects of arsphenamine are at the present time inexplicable.

In the so-called parasyphilitic stage of the disease (tabes and paresis) permanent damage has been done to the brain and spinal cord before the diagnosis may be made and no amount of antispecific treatment will restore function to dead neurons.

As to the value of the Wassermann test in diagnosis. The theory that it was a specific test was soon proven untrue. The test is useless for early diagnosis, of supplementary value only in secondary syphilis, of some use in the so-called latent and obscure syphilis, and of practically little value in para-syphilis. That is to say any of the classical symptoms of syphilis are of more diagnostic value than the Wassermann test. Its value in directing treatment is about the same as its value in diagnosis.

The last statements apply when the test is made by the highly trained serologist and when made by the non-expert the test is of still less value. The same serum in a certain percentage of instances gives divergent results in the most expert hands. The factors entering into the causation of such results, if not technical errors, are inexplicable or the expert would not let such diserepancies occur. When the test is made by a non-expert errors are multiplied. The factor of error, however, should not always be put on the serologist. He knows nothing of the patient's condition when the blood was taken and the disturbing factor may be in the blood at the particular time it was drawn or due to changes in the blood before reaching the laboratory or to faulty technique in obtaining it.

The assumption that a patient is syphilitic when the only evidence is a single positive Wassermann test is absolutely unwarrantable. The absolute faith that many physicians, the public, Boards of Health, and our courts have in this test is surprising. In many instances it may justly be said that the result of the test often brings with it more problems than it removes.

In illustration of all that has gone before in this paper I am going to cite three short histories.

Case 1. A woman with a well marked secondary lues, and a positive Wassermann test, was sent to a detention hospital. While there she received at least one injection of arsphenimine (the number is unimportant). Her husband took legal steps to secure her release. The court ordered a Wassermann test. It was made and reported negative. The woman was released, although the papular syphilides on the body had not faded out.

Case 2. A man of 35 years contracted syphilis in 1871, took treatment in a desultory way for a few months, was married in 1876 and has three children all living and well. His wife died several years ago, aged 72, of kidney disease. He consulted me in 1918 for a varicose ulcer of the leg. Aside from this and some arterio sclerosis he was in good condition. A Wassermann test taken at that time was reported positive. He is at the present time 84 years of age and 49 years after his infection able to attend to his business.

Case 3. This man gave a doubtful history of primary syphilis eight years ago. No definite diagnosis was made, but treatment was advised. He took pills for eight months; a year later an injection of salvarsan and two more in later years. His last treatment was in 1916. In 1920 he begun worrying about his condition and in an interval of seven weeks consulted seven physicians and had ten Wassermann tests. Four of the physicians gave him a clinical examination and three simply advised him to have a Wassermann test made. Four of the Wassermann tests were positive, four were negative and two were doubtful. The tests were made in six different laboratories. None of the four physicians who examined him clinically could find any organic trouble.

Comment is unnecessary. (Case I).

What is our criterion of cure? (Case II).

What is the status of this patient and what is the value of the Wassermann test as ordinarily performed? (Case III).

Now just a word or two more. Medicine has been defined as a science in its methods of study and an art in its application. Syphilis has been studied clinically for 400 years while the valuable contributions of the laboratory to its study are of comparatively recent date. Our accumulated clinical knowledge of the disease is just as good science as the contributions of the laboratory worker. Clinical experience has given us little to be forgotten and much to be remembered and laboratory science has in the main but confirmed our clinical experience. Without the art of applying our knowledge, laboratory science would be of little benefit to our patients.

We must not, therefore, be blinded by the glare of laboratory science, but consider all aspects of the disease in making our judgments and remember that we are treating individuals for syphilis and not syphilis alone.

THE LABORATORY DIAGNOSIS OF SYPHILIS*

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The literature pertaining to the laboratory diagnosis of syphilis is voluminous and varied. It covers a host of subjects, some of which have little in common except as they refer to the symptom complex of syphilis. On account of the broad scope of the subject, it is impossible to include all laboratory methods of value, nor can reference be made to extensive experimentation.

The purpose of this paper is to collect and correlate some of the laboratory diagnostic aids which relate to the various stages of syphilis and present these in somewhat connected form for the benefit of the practicing physician. In so doing, it is important that a general summary may be obtained which will emphasize some of the conclusive, practical factors involved in the subject.

Animal Inoculation.—Thus far animal inoculation has found no practical place in the diagnosis of syphilis. This, however, does not preclude the possible practicability of such a procedure, nor does it for a moment mitigate against the great importance attached to this phase of experimental work. The clinician and pathologist have much to learn concerning syphilis. The syphilologist and bacteriologist are far from familiar with the spirocheta pallida. It is probably true that better knowledge exists concerning this organism than that pertaining to other spirochetes. Much remains to be accomplished in developing knowledge concerning the biologic characters of the spirochete group and the pathologic conditions caused in their hosts. There remains for investigation and solution some thirty specific infectious diseases of unknown etiology in connection with some of which spirochetes may possess some etiological significance. The brilliant researches which have been made on the spirochaeta pallida have led the way for the future development of knowledge concerning the whole spirochete group. Experimental studies therefore, relative to this organism constitutes a valuable contribution for the literature.

Brown and Pearce[1] of the Rockerfeller institute for Medical Research, during the last year have published a most interesting series of five articles on the subject of experimental syphilis in the rabbit. Primary skin lesions in the rabbit were first reported by Hoffman, Löhe and Mulzer[2] in 1908, scrotal infection by Ossola[3] in 1909 and infection of the prepuce by Levaditi and Yamanouchi[4] in 1908. Valuable data is being collected bearing especially upon the incubation period, the specific early reaction following inoculation of the scrotum, skin and mucous membranes, specific scrotal chancres, the early spread of the virus around the area of the primary lesion through the perivascular lymphatics, the course of alopecias, onychia and paronychia lesions of the skin proper with the dermatological manifestations of generalized infection, the selective distribution of cutaneous infection and finally the character of the lesions on the mucous membranes.

The work of Brown and Pearce is of course not conclusive. In a personal communication from Baeslack, he states that all animals, especially rabbits, if not kept on a varied diet and in clean cages will develop skin lesions due to a saprophytic spirochete. In over eight hundred rabbit inoculations made by Baeslack no cases of generalized syphilis developed.

Eberson[5] reports the isolation of the spirochete from the blood and lymph glands of experimentally infected rabbits as early as seven days after testicular innoculation and before the appearance of the initial lesion.

Diagnosis of Syphilis by Culture.—Great stimulus was afforded the study of syphilis when it was found, a number of years ago, that the spirocheta pallida could be successfully grown on artificial culture media. As yet, cultural methods are not available as a practical routine aid in the early diagnosis of the disease. From 1910 to 1912 Noguchi[6], Mühlens[7], Baeslack[8], and E. Hoffman[9], were busily engaged in attempting to grow the spirochete in artificial culture media. These four investigators succeeded almost simultaneously. They found that the culture media consisting of plain or ascitic, inactivated horse serum agar afforded the best soil for the growth of the spirochete. Such a medium is placed in deep tubes and it is well to add to each tube a small

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piece of fresh rabbit kidney or testicular tissue.

Cultures of the spirochete after incubation of from five to seven days show a distinct growth along the line of inoculation. The culture shows a characteristic faint cloudiness throughout a considerable portion of the medium, especially in the bottom layers. No growth takes place in the upper layer of the medium as the organism demands anaerobic conditions.

The writer very distinctly remembers a most interesting visit with Dr. Mühlens in his laboratory at Seemanskrankenhaus und Institut für Schiffs und Tropenkrankheiten, Hamburg, in 1912. At that time Mühlens was not able to secure cultures from lesions on rabbits, all of his cultures having been secured from the original chancre. His work attracted considerable attention and many laboratories were begging him for transfers from his cultures.

At the same time, Noguchi of New York and Baeslack of Detroit were meeting with success in their attempts to cultivate the spirochete. Noguchi, as the result of his culture work, developed luetin. The luetin test was quite extensively used in the army during the recent war.

Baeslack and Keane[10] recommend the use of cultures for the diagnosis of certain cases of primary syphilis in which the suspected initial lesion does not present typical appearance on account of previous treatment with calomel, escharotics and antiseptics. In such cases satisfactory dark field examinations are made with difficulty. Since the spirocheta pallida appears to remain viable in the tissue for a period of at least twenty-four hours after removal it is recommended that such specimens could be placed in tubes of bouillon, sealed and forwarded to laboratories for diagnosis according to this method.

Microscopic Diagnosis of Syphilis in Initial Stage.—Reference has been made to the important work of Brown and Pearce and of Eberson, the results of which are of significance in connection with the early diagnosis of syphilis. The results indicate that after inoculation with spirocheta pallida the organisms may soon begin to multiply and spread by continuity through the surrounding tissues. Furthermore, it seems apparent that they soon may gain access to the lymphatics and blood stream and thereby be swept over the body. These researches show that such conditions may occur before the clinical diagnosis of initial syphilis can be made.

The importance of the early diagnosis of syphilis is well expressed by Tauber[11] who states that, "the early diagnosis of syphilis is an unknown quantity to many men who are practicing medicine in our times. The first week or so of the initial lesion, while syphilis is still a local condition, is the time that we employ every energy and endeavor to our diagnostic and therapeutic armamentarium to cure, for never again in the picture of syphilis for the individual patient or the state will this moment return."

In collecting material from the suspected chancre use may be made of an ordinary capillary pipette, prepared by softening a piece of glass in a bunsen burner. Serum is allowed to flow into the pipette by capillary attraction after which the tube is broken off, sealed and centrifuged for thirty seconds or more. The upper layer of serum is then transferred to a slide for microscopical examination.

If the suspected chancre is healed, Butler[12] recommends that a few drops of physiological salt solution be injected into the base of the lesion and that the tissue be macerated by rotating the hypodermic needle, after which, the saline mixed with serum is aspirated and placed on the slide for examination.

In certain instances the spirochete cannot be found in the initial lesion, either from the surface or by puncturing the base of the lesion. In such cases the microscopical examination may be made of aspirated serum from the regional lymph glands. The lymph gland is firmly fixed between the two forefingers and thumb of the left hand, after which the hypodermic needle is passed through the capsule of the gland. The point of the needle is then rotated to break down some of the glandular tissue, after which one-half to one c. c. of sterile physiological salt solution is slowly injected. The swelling of the capsule under the fingers is noted and after a few more rotations of the needle the mixture of salt solution and macerated tissue is drawn into the syringe and submitted to microscopical examination.

Baeslack[13] recommends the use of a suction apparatus which consists of a test tube drawn

to a fine point, with a side arm for the attachment of the rubber tube, which in turn is connected to a small suction pump or syringe. Cupping tubes of varying sizes are used to accommodate chancres of different sizes. This method possesses considerable advantage in certain cases as its use does not necessarily cause the flow of blood, but rather results in the collection of an abundance of serum from the lesion.

There are relatively many staining methods described for the purpose of demonstrating the spirocheta pallida. It is not necessary to dwell upon the staining values of spirochetes, inasmuch as this method is not generally followed in most laboratories in connection with practical diagnostic work. The spirochete does not have a strong affinity for basic dyes and therefore staining methods are used more especially in experimental studies.

The india ink method consists simply in the preparation of a smear of india ink mixed with the serum or fluid suspected of containing the spirochetes. This method is followed in many laboratories and affords a convenient procedure but is attended by certain diadvantages. The difficulty lies in securing a properly prepared preparation in spite of the observation of great care.

The dark field examination of suspected syphilitic material is the most reliable method for demonstration of the spirochete microscopically. By the use of the dark field the organisms are examined in living condition and therefore the characteristic movement of the organisms, which is the most important differential sign, is present. The satisfactory dark field apparatus consists of a permanent microscope stand with the dark field attachment and an arc light with reostat. The complete outfit should be placed on a board and after it is perfectly centered and adjusted, should be permanently attached to the board. It is therefore ready for instant use. In the routine examination of initial lesion it is recommended that the suction cup described above and the dark field be employed. Under ordinary conditions, positive diagnosis may be quickly made. Negative diagnosis however, should be reported only after repeated examinations. The appearance of the spirocheta pallida in dark field preparations affords one of the most fascinating and interesting microscopical observations. The spirochetes, appearing as shining cork screws, actively motile, exhibiting a backward and forward movement, present a dark field picture which is not forgotten.

Wassermann Test.—Bordet and Gengou[14] published the method for complement fixation in 1901. Neisser and Sachs used the method to differentiate albumin. Wassermann, Neisser and Brück[15] applied the method experimentally to determine the presence of substances yielding the fixation of complement with syphilitic extracts. Wassermann and others then found identical substances in the serums of syphilitic patients.

The Wassermann test is universally used for the diagnosis of syphilis, notwithstanding the fact that certain phases of the reaction are as yet unexplained. In approaching the subject of the Wassermann test from the clinicians point of view, it is impossible to take up in detail the technique of the reaction. However, for the sake of clearness it may be stated that the Wassermann consists first, in finding the smallest amount of complement (guinea pig serum) necessary to cause hemolysis of a standard amount of red cells (sheep) in the presence of a standard amount of amboceptor (immune rabbit serum). The second step consists in finding whether this amount of complement (or multiple) will hemolyze the red cells in the presence of amboceptor, patient's serum and antigen, or whether the unknown serum and antigen will "fix" the complement and prevent hemolysis of the red cells.

In submitting specimens of serum or cerebrospinal fluid for the Wassermann test it is well to bear in mind that there are several factors which may influence the results of the test. For instance, it has been found that should the patient indulge in alcohol the substances in the blood serum which react with the lipoids in the antigen may be rendered inert and thus a negative result may be secured from a serum which is really positive. The growth of bacteria such as staphylococci and streptococci in normal blood serum may cause positive results to occur which might otherwise be negative. Therefore it is important that in collecting specimens of serum for test ordinary antiseptic precautions should be observed. Again, there are variations within certain limits in the power of blood

serum to fix complement. With these conditions in mind and after consideration of the technique of the test the delicacy of the reaction becomes obvious and conflicting results as obtained in the hands of different technicians may be regarded more intelligently and perhaps more charitably.

In conducting the Wassermann test it should be remembered that the procedure consisits in the proper manipulation of a delicate biologic reaction. In other words, in the technique is involved the use of several biologic reagents, each of which must be carefully prepared. Moreover the reagents must be titrated and preliminary tests conducted in order that the test may be thoroughly controlled and dependent results secured.

Kahn[16] shows the advantage of standardizing the time of incubation of amboceptor and complement titrations and the time of final incubation of tests to a fifteen minute period. The results of his work also point to the importance of titrating both complement and amboceptor daily in the Wassermann test (guinea pig complement, sheep cell system).

One of the most important factors in all complement fixation work relates to the employment of proper antigen; thus in serology, complement fixation tests are utilized experimentally to check up other results in establishing certain organisms as important etiological factors in connection with specific, infectious processes. The question of the antigenic properties of syphilitic material is yet to be explained. The so-called syphilitic antigen in whatever form it is used must not be regarded as a true antigen. It is rather an extract which contains lipoids reacting with lipotrophic substances which are contained in the blood serum of the syphilitic individual. Fortunately the action in the Wassermann test is similar to the action of a true antigen. Considerable study has been given to the proper antigen for use in conducting the Wassermann test. The results of these researches have shown that in all alcoholic extracts of normal tissues which have been used as antigents the active principle is contained in the extracts and contrary to the early expectations there appears to be nothing distinctly specific in the presence of spirocheta pallida in antigenic extracts. On the other hand, it has been shown that the extracts of normal tissues give negative results in certain cases in which positive results will be obtained from the use of extracts of fetal syphilitic liver and cultures of the spirochete. Therefore, it is possible that the extracts of syphilitic tissues containing the lipoids may also represent certain specific antigenic substances due to the presence of spirocheta pallida.

Varney and Baeslack[17] found that the use of syphilitic gumma from the testicles of rabbits furnishes a more specific antigen than that representing syphilitic or normal tissue.

After reviewing the literature on the study of antigens, one is safe in advising for the routine Wassermann test the use of cholesterinized alcoholic extract of normal beef-heart muscle, and alcoholic extract of fetal syphilitic liver or normal heart. If three antigens are desired, Noguchi's acetone insoluble lipoid antigen may be used. From a series of 7,636 cases a comparison has been made of the results obtained from the use of cholesterinized and alcoholic extract of heart muscle as shown in the following table:

DIVERGENCE OF RESULTS IN COMPARISON OF CHOLESTERINIZED AND ALCOHOLIC EXTRACT ANTIGENS.

Table I.

	Cholesterinized		Alc. Ext. Antigen		
Total 7636	No.	%	No.	%	% Divergence
No. Negative	5,438	71.3	5,653	74.1	2.8
No. ++++	1,818	23.8	1,650	21.6	2.2
No. +++	197	2.5	62	0.8	1.7
No. ++	150	1.9	125	1.6	0.3
No. +	33	0.5	146	1.9	0.4
Total per cent divergence					7.4

Total number cases, 7636. Total number reported positive, 1954. Percentage reported positive, 25.5.

The above results, which concur with those of others, show that positive tests are secured more often from the use of the cholesterinized antigen. In many cases however, in which negative results are referable to the alcoholic extract while the cholesterinized yields positive results certain conditions appear to be responsible. For instance, in some cases of this nature reported in the above table the Wassermann test was applied for the purpose of determining whether or not treatment had been successfully carried out. Without dwelling longer upon this it may be safely assumed that the employment of at least two antigens as outlined above. is not only important but an essential

factor in conducting the Wassermann reaction. By this means each test is afforded a logical method of control and there is less likelihood for the occurrence of faulty reading and the appearance of inaccurate results.

The subject of variations in the Wassermann reaction is one which has received considerable attention. In consideration of this question the following well known facts have been recorded: Positive results may be obtained in cases of leprosy, hepatic disease, frambesia and scleroderma, also in the febrile stages of measles, scarlatina and variola. Serum collected from a patient after the administration of an anesthetic may yield false positive results. Cholesterinized extract may give a slight positive reaction with normal serum. Cholesterinized antigen is more sensitive than acetone insoluble extract of beef heart. If serums are kept for some time, anti-complementary substances may occur which may cause inhibition of hemolysis and result in a false positive. Relative to the last point Breuer[18] tested out the anti-complimentary power of seven anti-complimentary serums and concluded that, "a high anti-complimentary power does not interfere with a clear-cut positive reaction. The question of whether or not it is practical to undertake this titration and repetition of the test after the main portion of the specimen has been run, in preference to getting another specimen, must be left with the individual worker."

The Wassermann test represents a biologic reaction and has its "limits of delicacy." The clinician and serologist should not depend upon a single Wassermann as an indication of freedom from syphilitic infection nor rely upon the so-called two plus or three plus positive Wassermann as a diagnosis of the presence of the syphilitic infection, without taking into consideration all available clinical data pertaining to the case in question.

In consideration of this subject Rohdenburg[19] and his associates have presented the results of a statistical study of 27,956 Wassermann tests. Of these which were clinically active, those resulting positively were 92%. In 3,165 tests on known syphilitic cases certain changes in the results of the tests occurred, as is shown in the following table:

Changes from positive to negative.....69 times
Changes from negative to positive.....39 times
Changes observed in specimens taken 1 week apart.....24 times
Changes observed in specimens taken 2 weeks apart.....56 times
Changes observed in specimens taken 12 weeks apart.....28 times

The authors find no explanation for these fluctuating results, and emphasize the fact that the Wassermann test is not infallible and "its value is greatest when its limitations are clearly comprehended."

Solomon [20] has presented an interesting array of results of Wassermann tests made from the serums of three thousand patients by two independent laboratories, the laboratory of the Massachusetts Department of Health and that of the Boston City Department of Health. In this work there was complete uniformity of results in 93.44% of the cases, leaving 6.56% variations.

It has been determined by repeated observations that in many instances the Wassermann test of cerebrospinal fluid is of great importance. Kingery[21] has presented a study of the spinal fluid of 52 cases of congenital syphilis, Jeans[22] some 214 cases and Ravaut[23] 28 cases. The results conform in showing that cerebrospinal involvement is closely associated with prenatal syphilis. The technique employed in obtaining cerebrospinal fluid, when once acquired, is simple and should be followed as a routine procedure by those clinicians who are called upon to do extensive work in this line. In paresis the Wassermann test is positive in practically 100% of the cases, in cerebrospinal syphilis 100% and in tabes 95% of the cases react positively as compared with approximately 70% resulting with the Wassermann test of the blood. In many cases of syphilis in the tertiary stage where there are no clinical evidences of involvement of central nervous system, the Wassermann test of the cerebrospinal fluid yields positive results. The recent work of Wile and Hasley[24] shows that positive Wassermann test upon the cerebrospinal fluid may occur during the primary stage of syphilis when involvement of the nervous system is present. A goodly proportion of cases in the secondary stage, especially in latent secondary syphilis, result positively. It should be emphasized that when conducting the Wassermann test upon the cerebrospinal fluid for the purpose

of the determination of cure of syphilis, negative reactions should be obtained with no less than 1 c. c. of cerebrospinal fluid.

As an illustration of the importance of subjecting the cerebrospinal fluid to test, one case of tertiary syphilis may be cited which was subjected to a long course of treatment, the blood of which, over a period of several years, was submitted to approximately twenty-five tests. The majority of these Wassermanns yielded negative results. Finally when it was deemed advisable to discharge the patient a specimen of cerebrospinal fluid was subjected to examination with positive results. It is recommended therefore, that greater importance should be attached to the Wassermann test upon cerebrospinal fluid and that no case of secondary or tertiary syphilis should be discharged as cured serologically until a specimen of the cerebrospinal fluid has been subjected to test with negative results.

Okazaki[25] has done some work in connection with the Wassermann test upon the aqueous humor of the eye of syphilitics. From his work the author concludes that the positive Wassermann reaction may be secured from the aqueous humor simultaneously with its appearance in the circulating blood.

Graves[26] has contributed an interesting article on the subject of post-mortem Wassermann reaction and its value. This work is of special interest in that the results of the Wassermann tests could be controlled by the post-mortem findings.

Since 1910 it has been known that syphilitics, the serums from whom yielded negative or partially positive Wassermann reactions, would show positive reactions in the blood after the administration of arsphenamin. Gennerich[27] who first noted this phenomenon suggested the name of the "Provocative Wassermann Reaction." The cause of this reaction is not well understood and exception to its value has been taken by Pollitzer and Spiegel[28] However, the probable importance of the provocative Wassermann test in which the serum may show a positive Wassermann reaction from a few days to two or three weeks after the injection of the arsphenamin is shown by the following table prepared by Craig:

Table II.

Case No	Time since treatment	Time Since Wass. became neg.	Result of Wass. test	Result of Prov. Wass. test
1	12 months	12 months	—	++
2	13 months	13 months	—	—
3	14 months	14 months	—	++
4	15 months	15 months	—	++
5	16 months	15 months	—	—
6	17 months	17 months	—	++
7	18 months	18 months	—	++
8	19 months	19 months	—	++
9	20 months	20 months	—	++
10	21 months	21 months	—	—
11	22 months	22 months	—	—
13	24 months	24 months	—	—
14	25 months	25 months	—	++

The interpretation of the results of the Wassermann test is a broad subject in itself. In the first place it is understood that the physician should accept the report of the Wassermann test as a supplementary aid in his diagnosis of the case in question. In other words, the results of the Wassermann test furnish one of the symptoms and in conjunction with the history and clinical condition must bear equal weight. The army laboratories use four symbols in designating results. Complete fixation being shown by double plus, almost complete fixation one plus, partial fixation plus minus and doubtful hemolysis minus. Craig recommends the use of only three terms, such as positive, doubtful and negative in reporting results of the Wassermann test. Other laboratories follow the rule of four plus, three plus, two plus, one plus and negative.

In the initial stage the weaker grades of reaction are of greater diagnostic value than in the late stages of the disease. As a general rule, it may be stated that in the primary stage a one plus reaction may be of some value, but it is not diagnostic unless taken several weeks after the appearance of the initial lesion. A double or three plus reaction is significant and in the average case should be regarded as a positive diagnosis especially if taken three or four weeks after the appearance of the initial lesion. The four plus reaction occurs in about 14% of cases of primary syphilis during the first week after the appearance of the initial lesion, in 20% during the second week, 41% during the third week, 53% during the fourth week and 61% during the fifth week. In the primary stage a negative reaction is of the least value. In the secondary stage of syphilis approximately 95% of all cases result positively. The four plus reaction in the secondary stage is regarded as a reliable diagnostic sign. A two or three plus reaction should confirm the presence of any clinical symptoms but should

not be regarded as diagnostic. In the tertiary stage the negative reaction is not of value in eliminating the possibility of the disease unless repeated tests result negatively and symptoms do not appear. As stated above in such cases the cerebrospinal fluid should be tested as well as the blood. In latent cases of syphilis it is generally conceded that about 30% yield negative results. In latent syphilis therefore, the one, two or three plus positive Wassermann test should be regarded as significant, especially if confirmatory evidence is obtained.

Ohlmacher[29] voices the plea for a standard method of conducting the Wassermann test, including not only standard methods of technic but recognized symbols in rendering reports. Gradwohl[30] desires State Board regulations which would license technicians who engage in Wassermann work.

Lange's Colloidal Gold Test.—The value of the test in syphilis of the central nervous system is now quite universally recognized. The statement may be made that this test which Lange[31] described in 1913 affords one of the most important diagnostic aids in paresis. The reaction of the colloidal gold test is not fully understood. It apparently bears a distinct relation to the protein content of the cerebrospinal fluid.

In carrying out the technique of the test, which is a relatively simple procedure, great care must be exercised in the preparation of the solution. The chief difficulty depends upon the use of water which is not pure chemically. Absolutely pure water shows an H ion concentration of 1.0x10-7. To approach this degree of purity the following procedure is necessary: Employ highly distilled water collected through tin lined receptacles. After adding to it H_2SO_4 and $K_2Cr_2O_7$, distil into special glass container. Add barium hydroxide, distil and aspirate CO_2 free air through the distillate. The H ion concentration will then be about 1.4x10-7. The color reaction noted in reading the results of the coloidal gold test are classified as the "Paretic Curve," the "Luetic Zone Curve" and the "Meningitic Zone Curve."

Globulin Determination of Cerebrospinal Fluid.—The determination of the globulin content of the cerebrospinal fluid is of considerable value in the diagnosis of syphilis of the nervous system. The Noguchi butyric acid test is used in the army and by the majority of serologists. A positive reaction does not necessarily indicate syphilis as there occurs a protein increase in the cerebrospinal fluid in other organic diseases of the central nervous system. The positive reaction confirms other laboratory and clinical findings. The negative reaction assists in eliminating suspected involvement of the central nervous system.

The Precipitation Test.—The Sachs-George[32] test consists of a precipitation resulting from the mixture of syphilitic serum and cholesterinized antigen. Hull and Faught[33] report a modification of the Sachs-Georgi precipitation test, consisting of either cholesterinized or non-cholesterinized antigen, the use of smaller volume, the centrifugalization and immediate reading of the tests. The authors state that in a series of 296 serums, 22 cases which resulted positively in the precipitation test and negatively in the Wassermann test all gave history of syphilis so far as could be ascertained. This work is interesting and needs further study and verification.

Verne's Syphilitic Index.—In 1917 Verne[34] precipitated the colloids of serum with ferric hydroxide. This was accomplished with different dilutions of serums and it was observed that in the case of syphilitic serums the necessary dilutions differed from those of normal or other serums.

Cornwall and Aronson[35] have reviewed the work of Verne in which they trace the successive steps leading up to the colorimetric method known as "Verne's phenomenon," by which it is claimed that a syphilitic index may be obtained which "constitutes a sero-measure of syphilis and indicates the efficacy of specific treatment." Verne's phenomenon is now being studied in the laboratories of Columbia University and the New York City Hospital.

SUMMARY.

1. Experimental syphilis in animals and the development of cultural methods are yielding results which are of fundamental importance in the study of the disease and its specific causative agent. These researches also may succeed in throwing light on some of the present obscure conditions pertaining to some of the specific infectious diseases of unknown etiology.

2. The culture method may be used to advantage in the diagnosis of atypical initial

lesions which do not disclose the spirochetapallida on dark field examination.

3. The results of recent experimental work show that the spirochete may spread, not only by continuity, but also by matastasis before the clinical diagnosis of initial syphilis is possible. This work needs corroboration before definite conclusions can be formed.

4. The early diagnosis of the initial stage is of extreme importance from the point of view of treatment and permanent cure. The diagnosis should be confirmed microscopically. For routine work the suction apparatus, or cupping tube provides a convenient means of securing clinical material. The use of the dark ground illuminator (dark field) is to be preferred to india ink smears or staining methods.

5. There are several factors influencing the Wassermann test which should be known by every physician. Serum from an alcoholic patient may result negatively; presence of undue bacterial contamination in a specimen of serum will cause the appearance of a positive test; the peculiar wide variation in the complement fixing power of the blood of certain patients may produce irregular results. Positive results may be obtained in cases of leprosy, hepatic disease, frambesia and scleroderma, or after the administration of an anesthetic.

6. The literature covering the technique of the Wassermann test is full of suggested changes, many of which mark developmental stages in the theory and modus operandi of the reaction. Much study has centered around the standardization of reactions and proper antigens for use in conducting the test.

7. It may be assumed that the employment of at least two antigens (cholesternized and alcoholic extract) is important and essential for dependable results.

8. A Wassermann test upon the cerebrospinal fluid, in certain instances, is of great diagnostic value. The reaction is positive in the tertiary stage, even when no clinical manifestations of the central nervous system are present. A positive test upon the cerebrospinal fluid of secondary or primary cases indicates involvement of the central nervous system. No case of syphilis should be discharged as cured until after a negative 1 c. c. cerebrospinal fluid test has been demonstrated.

9. "The Provocative Wassermann" should not be disregarded by the physician, but should be used in certain cases when considered necessary.

10. The Wassermann has its "limits of delicacy." When confronted with Wassermann variations the physician should consider the biologic nature of the reaction. Carefully controlled reports show confirmatory results in the majority of tests performed by careful technicians. There is need, however, for the adoption of a standard method and perhaps State Board regulations and requirements for technicians.

11. In the interpretation of the Wassermann test, the physician should bear in mind the following observations: In the initial stage of syphilis the weaker grades of reaction are of greater diagnostic value than in the late stages of the disease. The Wassermann test results positively in a relatively small percentage of cases up to the end of the second week after the appearance of the initial lesion. After the third week, fifty per cent or more of the cases will give positive reactions. A negative reaction is of the least value in the primary stage. In the secondary stage of syphilis, approximately 95% of all cases result positively; therefore in the secondary stage dependence should not be placed upon the results of one negative test. In latent syphilis a weekly positive reaction should be regarded as significant.

12. Lange's Colloidal Gold Test should be employed especially in cases of syphilis of the central nervous system. Physicians should make sure that the laboratory which carries out the test use extreme care in the preparation of the re-agents used. With the colloidal gold test the paretic curve may be distinguished from the luetic curve.

13. Globulin determination and cell count of the cerebrospinal fluid afford valuable confirmatory laboratory evidence in many cases.

BIBLIOGRAPHY

1. Brown & Pearce; Jour. Exper. Med., Vol. XXXI, No. 6, 1920, p. 709.
2. Hoffman, Lohe & Mulzer; Deutsch. med Woch., 1908, XXXIV, 1183.
3. Ossola, cited by Truffi, M. Centr. Bakteriol., Ite Abt., Orig. 1909 XIVIII, 597.
4. Levaditi & Yamanouchi; Compt. Rend. Soc. Biol., 1908, XIVIII, 597.
5. Eberson; Jour. A. M. A. Vol. 76, No. 3, p. 160.
6. Noguchi; Jour. Exper. Med., 1912, 16, 199.
7. Muhlens; Handbuch der Path. Protozoen Prowa-

zek, Leipzig, 1912, 361.
8. Baeslack; Jour. Infect. Dis., Jan. 1913, 12, 55-67.
9. Hoffman; Zeitsch. fur Hyg. Und. Infekt., 1911, 68, 27.
10. Baeslack & Keane; Jour. A. M. A., Vol. 74, No. 6, p. 392.
11. Tauber; Jour. A. M. A., Vol. 73, No. 6, p. 1661
12. Butler; Jour. Lanc., July 1, 1919.
13. Baeslack; Jour. Infect. Dis., Jan. 1913, 12, 55-67.
14. Bordet & Gengou; Ann. Inst. Pasteur, 1901, XV. 289.
15. Wassermann, Neisser & Bruck; Deutsch. med. Wchnschr., 1906, XXXII, 745.
16. Kahn; Jour. Lab. & Clin. Med. Vol. VI, No. 3, p. 153.
17. Varney & Baeslack; Jour. A. M. A., Sept. 6, 1913, LXVI, 754-757.
18. Breuer; Jour., Lab. & Clin. Med., Vol. V, No. 5, p. 327.
19. Rohdenburg; Jour. A. M. A., Vol. 76, No. 1., p. 14.
20. Solomon; Jour. A. M. A., Vol. 74, No. 12, p. 788.
21. Kingery; Jour. A. M. A., Vol. 76, No. 1, p. 12.
22. Jeans; Cerebrospinal involvement in hereditary syphilis, Am. Jour. Dis. Child. 18:173, Sept. 1919.
23. Ravaut; Ann. de dermat. et. syph. 8:81, 1907.
24. Wile & Hosley; Jour. A. M. A., Vol. 76, No. 1, p. 8.
25. Okazaki; Japan Medical World, Tokyo, Jan. 3, 1920, No. 315, p. 17.
26. Graves; Jour. A. M. A., Vol. 75, No. 9, p. 592.
27. Gennerich; Berl. Klin. Wchnschr., 1910, Sept. 19, No. 38.
28. Pollitzer & Spiegel; Am. Jour. Syph. 3:252, 1919.
29. Ohlmacher; Minnesota Medicine, Vol. III, No. 12, p. 590.
30. Gradwohl; Jour. A. M. A., Vol. 76, No. 2, p. 127.
31. Lange; Ztschr. fur Chemotherap., 1912-1913, 1 33; Berl. klin. Wohnschr., 1912, XLIX, 897.
32. Sachs & Georgi; Munch. med. Wochenschr., 1920, 67, 66.
33. Hull & Faught; Jour. Immunology, Vol. V, No. 6, p. 521.
34. Verne; Presse Medicale 1917, 25, p. 704.
35. Cornwall & Aronson; Jour. A. M. A., 1920, 75, p. 1697.

THE INDICATIONS FOR X-RAY THERAPY IN TUBERCULOSIS*

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Tuberculosis of the skin was one of the first diseases treated by x-rays. Such good results attended their use that this form of therapy soon became one of the recognized methods in combatting lupus of all types. At first, the application of x-rays as a curative measure was wholly empirical owing to the fact that nothing was known of the biological action of this form of energy. This naturally stimulated research work all over the world, but the enormous amount of available clinical material in the continental cities accounts for the fact that many of the early experiments were carried out in European medical centers.

As was to be expected, these experiments were conducted along lines in harmony with the medical trend of the times. Two schools of thought developed, the one holding that the action of x-rays on diseased tissue is direct and that they inhibit growth and development in the same manner as the actual cautery or a chemical irritant; the other, insisting that the biological effects are the result of the production of immunizing substances due to the irritating action of the rays on cellular metabolism.

As our knowledge of the effects to be obtained by x-rays gradually evolved, certain well defined principles became established. One of these laid down by Holzknecht is as follows: "The metabolic processes of any given type of cell are increased in direct proportion to its susceptibility to the irritating effect of x-rays." Another law laid down by Schwarz stipulates that small doses of x-rays have a stimulating effect; large doses, a depressant effect on cellular activity.

Analyzing these two laws, it appears that the ideas set forth by both the schools of thought, above referred to, are partly correct. Furthermore, it becomes evident that in the application of x-rays to the treatment of disease, the manner in which favorable results are to be attained must constantly be held in mind. Whether the dose to be administered is to be intensive and hence have a direct, destructive action on the diseased tissue, or on the contrary, is to be small and stimulating in character, effecting a curative action in the same manner as a vaccine, is a question which ever confronts the radiologist, and while it is a fact that standardized methods of treatment are gradually being developed, yet it must be conceded that considerable chaos and difference of opinion still exist in the practical application of x-rays to the treatment of disease.

It is, however, quite generally agreed among radiologists that some types of disease require

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intensive irradiation in massive dosage, while others require small dosage repeated at rather frequent intervals. As an example of the former, basal celled epitheliomata is cited; of the latter, tuberculous peritonitis. In both instances it very positively can be stated that favorable results are obtained only in those types of cases in which the patient has a rather strong resistance to the disease. In short, the action of x-rays is that of a synergist and hence their administration in suitable cases becomes the deciding factor in helping nature to effect a cure.

Much of our knowledge of the technic necessary to produce desired effects under given conditions is the outgrowth of actual experience. The pioneers in x-ray therapy had nothing to guide them, and so our present fairly well standardized methods are due to the accumulated experiences of these men in the treatment of diseases in which no known therapy was productive of satisfactory results.

Two epochs mark our progress. The first extended to about the year 1910 and was largely limited to the treatment of superficial diseases, particularly of the skin. With the development of the high tension transformer, as used today, and the perfection of x-ray tubes, the treatment of deeper diseases became more and more practical. In unison with the development of these more efficient generating units, there gradually evolved a more scientific application of x-rays. Filters and crossfire methods of irradiation did much to standardize methods and very soon effected greater uniformity in the reported results.

During the first epoch referred to above, lupus was the only tuberculous lesion which responded favorably to x-ray therapy. Of the different forms of tuberculosis of the skin, lupus planus is the least responsive. The hypertrophic forms are not always curable, yet favorable results are to be expected in the majority of cases.

Some authorities recommend the use of resorcin in lupus vulgaris combined with irradiations. Still others advise an initial curettement of the affected area and subsequent x-raying. Kusnitzky of Neisser's clinic reports 700 cases treated in this manner with excellent results and without a single complication, such as the production of an acute miliary tuberculosis, or the secondary infection of the internal organs with tubercle bacilli. Success in the treatment of lupus depends upon the intelligent use of hard x-rays. A review of the literature on the subject, shows that the percentage of favorable results gradually increased as radiologists devised suitable methods of filtration and utilized more penetrating x-rays having a more selective action on the diseased tissue.

The second epoch in the use of x-rays for therapeutic purposes was the outgrowth of the appreciation by progressive radiologists that favorable results in deep seated diseases could only be obtained by the use of hard x-rays. This accounts for the fact that cures were obtained only in superficial diseases during the first years, since only soft and medium hard x-rays were utilized. However, with the development of more efficient transformers of energy and especially the Coolidge tube, the use of penetrating irradiation became wholly practical and this led to the initiation of deep therapy as now practiced, and made possible the treatment of many tuberculous conditions other than lupus.

Even so, success in the treatment of bone tuberculosis with x-rays depends largely upon the thickness of the part treated. The small bones and joints which are surrounded by a minimum amount of soft tissue are more responsive to irradiation than those which are embedded in a large amount of muscle and fat. Hence it is that good results are reported in secondary tuberculosis of the small bones and joints, of the hands and feet. Moreover, closed tuberculous processes are more amenable to treatment than those in which a sinus or fistula are present. Primary tuburculous infection is regarded as a surgical disease and is not adapted to x-ray therapy.

Irradiation of tuberculous bone and joint disease in children is not contra-indicated, since no deleterious effects on the growth of the osseous structures have been noted. The prognosis in tuberculosis of the knee is regarded as bad. Krecke reports a series of ten such cases treated without a single cure. To these the essayist can add a case treated in 1915 without the least evidence of improvement.

Tuberculous caries of the ribs responds well to irradiation. Oehler reports excellent results by irradiation in a large series of cases.

Among them, there were ten, which remained uncured after rib resection, that healed promptly when treated with x-rays. In summing up the reports from various sources, it is estimated that secondary tuberculosis of the small bones and joints can be cured by suitable x-ray irradiations in about 20 per cent of cases.

Tuberculosis of the larynx has been treated successfully by radiotherapy and the prognosis in this disease is favorable. The results reported in pulmonary tuberculosis vary greatly and appear to depend somewhat upon the enthusiasm of the radiologist as well as the technic of administering treatment. Massive doses are without doubt contra-indicated and certainly are not without danger, since they result in a rapid release of toxins which, upon absorption, produce secondary, deleterious effects. For this reason, small intensive doses, given at stated intervals, each does administered over a new portal of entry, are more suitable. The effect produced by this method of treatment is analogous to that which results from the administration of a vaccine.

To be sure, all types of pulmonary tuberculosis are not adapted to x-ray therapy. Only the foolhardy would attempt to arrest an advanced case with cavity formation and hope to stimulate the formation of cicatricial tissue, or would venture to treat miliary or acute progressive tuberculosis of any form. Subacute, incipient phthisis and those chronic cases in which there are well circumscribed areas of tuberculous inflammation, and no others, should be subjected to radio-therapy. Good results are reported as possible in the former and fair results in the latter if the treatments are carried out as above indicated.

Tuberculous peritonitis should be treated by the same technic as that described in phthisis. The prognosis in this disease is excellent if the liver, spleen and kidneys are not involved. Krecke reports the cure of a case of ileocecal tuberculosis which had been verified by exploratory operation and in which resection, on account of the disseminated character of the disease, appeared impracticable. Spath speaks of a case of an orange size tumour of the adnexa, similarly verified as tuberculous and positively proved by histological examination, that was cured by eighteen x-ray treatments. No favorable results are recorded from the use of x-ray therapy in tuberculosis of the genito-urinary tract.

Tuberculous adenitis, which in this country is generally regarded as a surgical disease, promises the highest percentage of cures by x-ray therapy of any tuberculous inflammation. During the years 1913 to 1918 inclusive, Dr. August Schonfeld of Vienna completed the treatment of 305 cases of tuberculous adenitis of the neck. Of these, he reports 196 as cured, 96 as greatly improved, and 13 as unimproved in spite of thorough and painstaking irradiation. Reduced to percentages, his results are as follows: cured 64.2% greatly improved 31.5%, unimproved 4.3%.

In conclusion, it may be stated that x-ray therapy is of distinct value in the treatment of tuberculous inflammations, and that its use in selected cases, in conjunction with other methods of proved value, is definitely indicated.

THE ACQUISITION OF USELESS KNOWLEDGE*

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When a dog has eaten well he lies down and sleeps. When a man has eaten well he sits down and smokes or stands up and talks. I have always greatly admired dogs. However, there is one good thing about the after dinner smoke. It is conducive to a philosophical frame of mind, and its philosophy is one of comfortable self-indulgence. I trust, therefore, you will bear with me if this evening I propose a philosophy of self-indulgence.

In speaking on the topic "The acquisition of useless knowledge," one might be expected to animadvert on the uselessness of some of the knowledge acquired in the university medical course, for there are some things in that course, premedical, medical, and clinical, which we all discover are not all that they were cracked up to be by the serried specialists who overloaded us with details concerning their specialties. But our error has been in assuming in the first place that these bits of really useless knowledge were useful. It is only our disappointment that hurts. Had we known

*Talk before the Medical Six-O'clock Club, University of Minnesota, Minneapolis, Tuesday, May 24, 1921

from the start that some of these things were really but froth on the cup of efficiency, we would either have let them blow away unheeded or enjoyed them just for the iridescence of their hot-air filled bubbles. Then there would have been no disappointment. It is the disappointment that brings the bitter flavor. Useless knowledge to be thoroughly enjoyed must be frankly and unmistakably useless as one acquires it.

The week before last here at the University we had a most inspiring educational symposium. The relation of the University to the commonwealth was brilliantly discussed in many phases. For two days we listened to constructive criticism of our present methods and material of university education. A composite vision of better ways and broader functions of the University in training better and more serviceable citizens for the state was ably portrayed. It was all very convincingly said, and one could but nod his head in acquiescence. Yet when it was all over some of us had a slightly disturbed sense of a lacking note. Through it all, University faculty activity was emphasized and university student passivity assumed. The occasional student's inherent capacity for sturdy growth even under didactic teaching was not mentioned. I have an old gardener who, even in wet weather in the spring, unless watched, runs the hose every morning and every evening on his growing plants. Some of them are drowned, and at best when the weather is warm the rest grow up spindling and sappy. I excuse my gardener because he does love to run the hose, and besides he is only a patient out on parole from the State Hospital for the Insane.

The premedical and medical course as prescribed in Class A medical schools under the stimulation of the American Medical Association, is at present so thoroughly filled with ostensibly useful subjects to each of which are allotted exactly so many departmental hours that there is no time left for useless subjects. True, the bulletin states "Elective courses are offered in the fourth, fifth, and sixth years These are listed under Departmental Statements." But when one turns to the "Departmental Statements," one finds the elective courses are all intensely useful and all accurately measured out by the semester hour. In fact, from the time the medical student leaves the High School until he begins the practice of medicine all his work is arranged on a strictly clockwork schedule of ostensibly useful studies. This is, no doubt, as it should be. And, do not misunderstand me! I hasten to disclaim any desire to suggest the scheduled requirement of any useless subject. On the contrary, I suspect that the requirements even in our most useful courses are altogether overdone. In meeting these requirements the faculty is apparently attempting to ladle out heaping measure and the students struggling to withstand the overdose. The result is a skillful but overworked faculty and a student body equally skillful in meeting the hour requirements by the scant fraction of a minute. The addition of new courses even in the most seductive of useless subjects would only result in greater skill in the doubtful qualifications so eminently possessed by both faculty and students. These carefully prescribed courses somehow remind one of those held in North Dakota every fall for greyhounds coursing jackrabbits,—the greyhound is the swifter, but the jackrabbit is usually the more artful dodger.

And perhaps, after all, the product of such a system of education as the present is the most desirable. It may be that in a republic efficiency of the individual as a unit in the state is not only the greatest but the only consideration. The old Greek philosopher's dictum that the individual should spend one-third of his life in training, one-third in his personal enjoyment, and one-third in the service of the state is perhaps not applicable to modern conditions. Certainly the order in which he placed the thirds is not the order of today. The medical student spends the first third of his life in learning, and a little more than the second third in the service of humanity. The weak point in our present time apportionment lies in the fact that after two-thirds are gone, there still remains another third at the end of life for which frequently no preparation has been made. Thus, the man who knows only the science and art of his own profession and ostensibly entirely abandons interest in both when he retires from practice is a sadly misplaced unit in the community. His service to the state is over but he yet lives. Without internal resources of his own and without the means of

becoming in harmony with his environment other than by way of his useful but, withal, narrow life service he is psychologically distraught. He is apt to commit agriculture, California, or suicide. Sometimes even at this late date he attempts to interest himself in the acquisition of useless knowledge, but it is usually difficult to become interested in postage stamp collections after one is sixty, unless the germ was planted at a more impressionable period. Indeed, the retired professional man who has no hobby, no perfectly useless bit of knowledge with which he may play, is apparently a fit subject for merciful euthanasia.

But even the busy doctor must relax before the last third of his life. Few minds are capable of keeping up continuously the speed at which the educated physician of today must work in the service of the community. There are, and of right ought to be, frequent periods of relaxation. Usually these are spent, and of right ought to be spent, in physical pleasures. For example, in the medical profession are probably more enthusiastic hunters than in any other profession. But, hunting comes for short periods only, and with the gradually increasing restrictions of our game laws these periods are becoming shorter and shorter. The fishing season still remains fairly long, but the length of unwarrantable fish is getting longer. Golf in the north with six months of winter and three months late spring, can claim attention for but a short period. The total length of the closed season on game, fish, golf balls, and even medical society meetings is more than half the year, and one cannot always choose the other half when necessity for relaxation is forced upon one. How desirable at these times is the pursuit of some form of perfectly useless bookbourne knowledge, which by its very uselessness gives the desired relaxtion. Dr. Osler, that beloved master of medicine, even in his most active years, spent his hours of relaxation in reading things wholly unrelated to medicine, and much of his charm, as well as his personal pleasure, came from his knowledge of things not medical.

Even in the crowded years of a University medical course, there are times when one grows weary of prescribed science and needs to turn to something which will rest the mind without stultifying it. Thus, there come hours between the setting and the rising of the sun when the companionship of good books on perfectly useless subjects may be profitably sought even during a University course. It would be interesting to know the annual circulation of such books from our University library. The usual story is that the medical student has no time for such reading. Pardon me, but I believe he could profitably make the time. Yes, I believe it is possible even in our efficient University for the student to obtain for himself some degree of self-culture despite the flood of teaching with which he is deluged.

But suppose the time taken for the acquisition of useless knowledge does subtract somewhat from the time necessary for the acquisition of useful knowledge, does it necessarily impair the efficiency of the professional man in his duties to the state and to humanity at large? It the state necessarily the worse off? In the world war Germany, that boastedly most scientific and most efficient nation, the one that had learned to utilize in the highest degree the greatest variety of human knowledge, showed that in the process she had not only lost her soul and her honor, but also, even for her own selfish purposes, her ability to interpret the thoughts or foretell the psychologic reactions of other peoples. And now her efficiency has gone from her along with her happiness. She has returned again to a middle age struggle to carry on her merely vegetative functions. She tends to despondency and suicide. The nation that encourages the philosopher, the poet, and the artist will live longer than the one which neglects these and founds its future only on science. Nations, like men, "cannot live by bread alone."

What are the subjects of useless knowledge in which one may luxuriously indulge one's self not by taking University courses but by leisure reading and study? One hesitates to mention any of them in the presence of their devotees who would immediately rise and claim for them paramount useful applications. But as the humble learner seeks things out for himself, he usually will not go far enough to find the blight of usefulness in astronomy, in geology, in paleontology, in anthropology, in archeology, or in history. Yet each of these subjects, if taken in moderation, gives a man a more perfect orientation of himself in the uni-

verse and makes him less sensitive to the petty disappointments of his own or other's abortive attempts at remaking the world in a day. They all teach patience. The record of the slow grinding of the mills of the gods in the making of the universe, in producing a habitable world, in populating it with evolving types of animals, in distributing races of mankind, and in the development of the arts and sciences and of various social states, is a field of study in which it is delightful to wander. And all the subjects in this field have the additional desirable qualification of offering little temptation to a man having a mere speaking acquaintance with them to show off his modicum of knowledge and to make it pass for profound learning. This is one of the most important points to be considered in the acquisition of useless knowledge for its own sake. The moment one acquires sufficient familiarity with a subject to speak of it learnedly to strangers, the subject has lost its charm of uselessness since it has become useful to the possessor as a means of publicity. The truest test of personal enjoyableness of useless knowledge is its flavor in solitude. Talk of it much, and it becomes like that chastity which has been successfully proven by legal process.

The appreciation of music, of poetry, of painting, of sculpture, and of art in general are all most delightfully useless accomplishments. True, the appreciation of music in its more strenuous forms is open to the possibility of being useful as a means of public aggrandizement. Not everyone who pays $10.00 each for grand opera tickets is doing it solely for the love of music. The dress in which grand opera is usually heard is evidence of the usefulness of music as a medium of publicity. But the study of grand opera from the gallery or by one's own fireside with the common garden variety of phonograph is not readily interpretable as a means of seeking social distinction. The perusal of Shelley's "Cloud" will not make one a neighborhood wonder as a weather prognisticator, but it may give him hours of enjoyment even in times of serious illness. The Art Institute in Chicago and the Metropolitan Museum in New York give more opportunities for the enjoyment of art than the west side of Michigan avenue, or Broadway at 42nd Street, though one's presence there is not so useful as a means of ostentation. Parenthetically it is a bit too bad that one is apt to find in the Innis room in the Art Institute on any free admission day more foreign-born than American-born citizens, and that the gold and the jade ornaments in the Metropolitan Museum in New York attract more youthful American visitors than does the Rembrandt room. I am wondering how many here are familiar with the great mural paintings in the Capitol in St. Paul or with the best things in the Art Institute and the Walker Art Galleries here in Minneapolis. Have we all seen those perfectly useless but wonderfully artistic creations, the animal groups in the Biology building, only a stone's throw from the medical buildings on this campus.

One of the speakers at the Educational symposium two weeks ago stated that in times past the opinion of the physician in matters of religion was apt to carry as much weight as that of the parish minister. Today it is feared that the physician has little interest in religion either as a mode of fire insurance or as a psychological phenomenon. He is apt to think that his scientific training has neutralized his Sunday school teaching, while his literary studies, if any, have omitted any adequate consideration of the historical development of religion, that factor which has controlled the policies and movements of men and nations for centuries. It is suggested that however little or great his professed religion, the intellectual man may find that a speaking acquaintance with the historical development of the religious concept as it has grown up from demonology is one of the most interesting bits of time-consuming information in which he may indulge himself.

Without wearying you further, permit me to sum up what I have said by urging upon you as young men and young women the desirability of finding time, despite your multiferious duties in preparing yourselves as citizens efficient in the service of humanity, to devote some time also to the acquisition of useless knowledge purely for the enjoyment you may find in it. This enjoyment will come mostly in the little hours in between, in the days of rest, in the days of relaxation enforced by sickness, by overwork, by age. It will give some mental association with Plato, with Marcus Aurelius,

with Emerson. It will help make life worth living when nothing else seems worth while. The saying of Roger Bacon is still true, "Learning maketh a man fit company for himself."

PLASTIC SURGERY OF THE EYELIDS AND ORBIT.*

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Of the many advances in surgery developing out of the late world war, that of plastic surgery of the face has been marked and of general interest. Though at first poorly organized, this special branch of war surgery gradually became more and more highly specialized. Centers were established for the plastic and osteo-plastic treatment of facial injuries including burns, thereby affording unique opportunities for study and concentration of effort in the restorative treatment of the marked facial deformities so frequently met. To those who were engaged in this work, its uninterrupted progress and increasing possibilities were a source of gratification and stimulation to greater efforts on behalf of the many patients who were entitled to return to useful civil life without becoming objects of pity.

During the earlier periods of this work, more attention was paid to the repair and restoration of the larger facial defects, particularly those of the lips, cheeks and lower face. Many of the wounds of the upper face, including extensive injury to or loss of the eyelids, conjunctival sac, orbital margins, malar bone, etc., were treated by a plastic skin closure of the defects without restoring contour and recourse was made to the wearing of artificial facial masks attached to spectacle frames. Such artificial restorations were constructed by Captain Durwent Wood of London, England, by Captain Walter Duff of the Canadian Medical Corps and by many members of the dental corps of the Canadian and American forces. Many of these masks present a very good appearance but changes in the underlying tissues necessitate frequent readjustments and their upkeep and repairs constitute a problem of considerable difficulty of solution.

In 1918 and 1919, greater opportunities enabled the surgeons to make a more careful study of the surgical restoration of the eyelids and orbit and the results obtained have more than justified the attempts made to restore the normal contour and appearance of the parts and to make possible the wearing of artificial eyes. It may be now safely stated that it was but rarely necessary for patients to wear artificial masks except as a temporary expedient during the intervals between plastic operations.

In the surgical restoration of the eyelids, many of the well known pedunculated flaps (Dieffenbach, Fricke, Von Langenbeck, Tripier, etc.) have been used with good effect, but in a large number of patients with extensive injuries or missing eyelids, considerable modification of these flaps with regard to their size, shape and thickness became necesary.

The Restoration of Contour.—One of the great problems is that of restoration of contour insofar as the orbital margins and malar region are concerned. For this purpose, two well established methods are available after the skin and subcutaneous tissues have been restored sufficiently by preliminary operation. I feel that it is inadvisable in the average case to attempt both the skin restoration and the contour restoration (the correction of marked depression) in one operation.

The first method, that of implantation of costal cartilage (autogenous or homogenous) has a more universal application. Staige Davis has shown experimentally that implanted cartilage lives and maintains its exact shape and except for a very slight rounding of any sharp edges that may have been present at the time of its implantation. Our clinical post operative observations confirm these findings. The cartilage should therefore be trimmed to the desirable shape and size and carefully fitted to place before being held in position by suturing the overlying subcutaneous tissues and skin.

The resistance of cartilage to infection is well known and for this reason its use for transplantation is greatly to be preferred to bone grafts in the surgical restoration of contour of the upper parts of the face. In order to obtain the maximum of rigidity where desireable, one should place or wedge the cartilage in close contact with the underlying periostium in order to ensure a firm, fibrous union.

*Candidate's thesis, presented before the Minnesota Academy of Opthalmology and Oto-laryngology, February 26, 1921.

The second method is the transposition of the anterior portion of the temporal muscle to the region of depression. If necessary, the anterior two-thirds of the muscle may be dissected free from the temporal fossa and its fibers separated from the remaining posterior portion as far down as its coronoid insertion. When carefully done, its nerve supply is largely preserved, thus preventing atrophy and fibrosis of the transplanted muscle. This portion of the muscle may then be swung forward on its coronoid pedicle and sewn in position in the malar region or in the infraorbital region, sometimes as far forward as the inner canthus. This method is chiefly of service in cases where there is loss of the malar portion of the zygomatic arch. This permits transposition of the muscle without undue twisting or constriction of its pedicle. The muscle is obtained by means of a vertical incision extending upwards from the zygoma and situated about 1 cm. anterior to the ear and within the hair line to avoid scarring. This method of facial contour restoration was introduced by Major Gillies, officer in charge of the British Section of the Queens Hospital, Sidcup. I have used it in many cases and find it of great service. In some of the more extensive cases, this method did not completely restore contour, but provided a sufficient connective tissue bed for the introduction of costal cartilage, the implantation of which otherwise would have been impracticable.

Large depressions may also be filled by using "tubed" pedical flaps from the neck or upper chest in three-stage operations.

Eyelid Operations For Facial Paralysis.—Thin strips of cartilage have been inserted beneath the margins of reconstructed eyelids and have been of decided value in improving the appearance and in maintaining artificial eyes in position. Major Gillies, used this method with fair success in several cases of complete eyelid paralysis where the peripheral facial nerve injury was so extensive that recovery by spinal accessory or hypoglossal anastomosis would be impossible. In some cases attempt was made to obtain a spring-like action by shaping the cartilage like a bow.

In one case of complete peripheral facial paralysis I used a modification of the temporal muscle method by transplanting a very narrow strip of temporal muscle and fascia completely encircling the palpebral fissure through small tunnels made in both eyelids close to the tarsal plates. This gave the patient greater protection and comfort by diminishing the vertical diameter of the palpebral fissure and in addition markedly improved the appearance of the eye. The effect, however, seemed to be entirely mechanical for no action of the transplanted muscle could be demonstrated.

In many cases of facial paralysis tarsorrhaphy resulted in considerable improvement in appearance and afforded greater comfort to the patient. The lash-bearing area of the lower lid for a distance of some three or four mms. internally from the external canthus is completely excised. A corresponding amount of tissue is removed from the conjunctival side of the upper lid margin without encroaching upon the upper lashes. The two raw areas are sutured firmly in apposition with interrupted fine silk.

Cartilage Transplantation Into Tenons Capsule.—This operation has been performed in a large number of cases for the purpose of correcting the sunken-in appearance of the artificial eye and to give the same better movement. The results have been most encouraging from a cosmetic standpoint. Autogenous cartilage is preferable and it is necesary to take the entire thickness of the costal cartilage in order to obtain a sufficient amount. Many different shapes of cartilage have been inserted varying from that of a sphere made of one or two pieces to a ball and cone arrangement[2]. I have found an egg-shaped piece of cartilage most suitable. The technique of the preparation of the bed for the cartilage is as follows:

A horizontal incision about 1.5 cm. in length is made through the middle of the posterior wall of the conjunctival sac and Tenons capsule is opened and enlarged sufficiently to hold a piece of cartilage about 1.8 cm. in length by 1.2 cm. in diameter at its anterior end. In order to prevent undue tension of the conjunctiva over the cartilage it is advisable to undercut above and below sufficiently to permit slight eversion of the margins of the incision which are then firmly closed by mattress sutures of fine catgut. Failure to do this has resulted in the exposure of a small area of cartilage in several of our cases. In these the

cartilage has invariably become covered over by granulations in three or four weeks time without affecting the ultimate results. In this regard, cartilage is much superior to the hollow spheres of glass or metal used in the Mules' operation which if uncovered are usually extruded. The appearance and movement of the artificial eye over a cartilage transplantation frequently simulates the normal to such a degee that it escapes detection. In this operation the chief problem is to determine and insert a piece of cartilage of the correct shape and size in order to insure the relief of the sunken-in appearance of the artificial eye and obtain the maximum range of movement.

Skin Grafting in Surgery of the Eyelids and Conjunctival Sac.—Probably the most outstanding advance in plastic surgery developed in the late war is that of the epidermic inlay (skin graft inlay) introduced by J. F. Esser, of Holland. A full description of this method is published in the Annals of Surgery, March, 1917. The essential features of the technique described by Esser are as follows: Dental impression compound (Stents manufacture preferred) is sterilized by boiling and in its softened state is used for the purpose of making an exact mold or impression of the surface or cavity to be skin grafted. A thin, Thiersch graft is then cut and wrapped around the mold with the skin surface in contact with the mold. Esser states that the Thiersch graft must be everywhere the same thickness and equally stretched upon the impression mold. The whole is then inserted into the previously prepared cavity and the graft is held in firm contact with the tissues by suturing the margins of the wound over the graft-covered mold.

The Surgical Enlargement of the Conjunctival Sac.—Adhesions and losses of portions of the conjunctival sac are of frequent occurence in war injuries of the eyes and as scar tissue contraction increases the maintenance in position of an artificial eye becomes more and more difficult. For these conditions, Esser has devised a method of enlarging the conjunctival sac by means of a buried skin graft. His technique is as follows:

An incision is made through the eyelid skin parallel to the palpebral fissure and extending laterally according to the extent of the conjunctival deficiency. The tissues are then

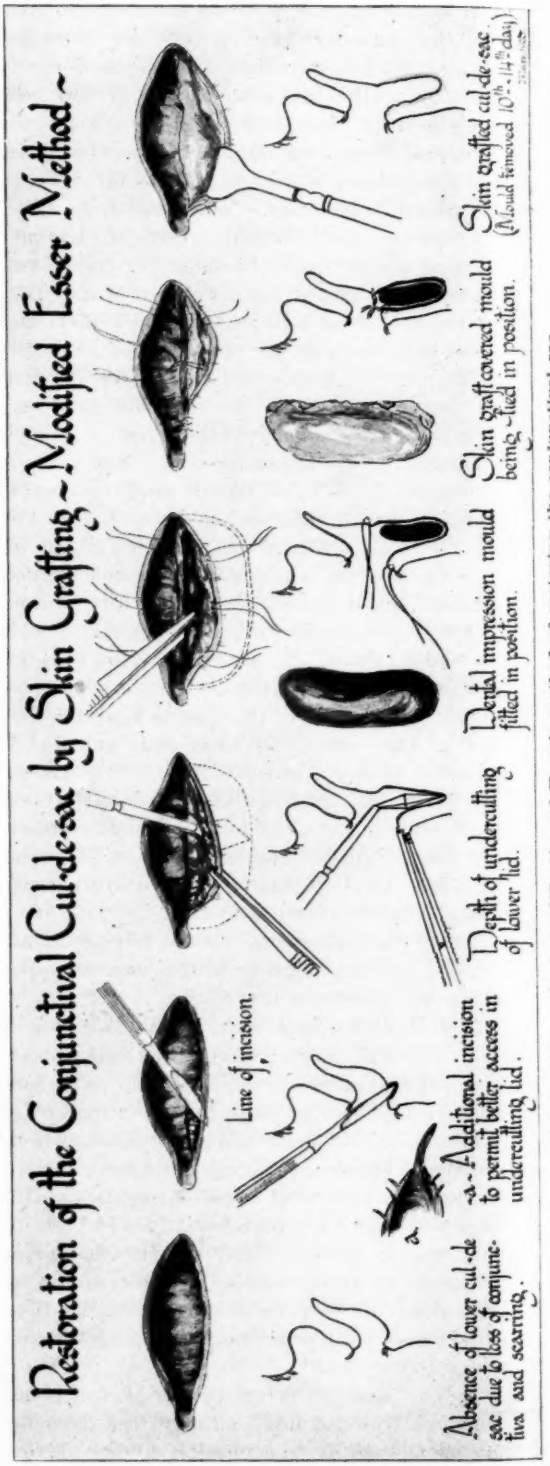

Restoration of the Conjunctival Cul-de-sac by Skin Grafting - Modified Esser Method -
Absence of lower cul-de sac due to loss of conjunctiva and scarring.
-a- Additional incision to permit better access in undercutting lid.
Line of incision.
Depth of undercutting of lower lid.
Dental impression mould fitted in position.
Skin graft covered mould being fitted in position.
Skin grafted cul-de-sac (Mould removed 10th-14th day)

Fig. 1. The author's modification of Esser's method of restoring the conjunctival sac.

undercut as close to the conjunctival sac as possible without perforating into the same, and an impression of the cavity thus formed is taken with dental impression compound sterilized by boiling. This mould is then trimmed until the margins of the incision may be brought together over it without undue tension. A thin Thiersch graft is then cut from the inner surface of the upper arm and wrapped around the mould. The whole is inserted into the cavity and the margins of the incision carefully sutured together. In two weeks' time an incision is made through the conjunctiva overlying the mould, which is then removed and the epithelialized fornix thus formed is maintained by a temporary prosthetic shell until an artificial eye may be fitted. This method was used with success by the surgeons of the Queen's Hospital. I have modified the technique described by Esser in that the incision is made at the desired point in the conjunctival sac instead of through the eyelid skin. The tissues are then undercut until a cavity somewhat larger than the desired enlargement of the sac is obtained. The impression compound mould is then made, covered by the skin graft and buried in the usual manner by suturing together the cut margins of the conjunctiva. In many cases it may be found somewhat difficult to make the incision close to the Tarsus and accomplish the desired undercutting, fitting and insertion of the mould, etc. In restoring the inferior sac this difficulty can be readily overcome by making an incision outwards and slightly downwards for a distance of 1 cm. from the external canthus. (Figs. 1, 2.) This will permit eversion of the lid and will render the operative field quite accessible. This modification has the following advantages:

1. Unnecessary scarring of the eyelids is prevented and the normal elasticity of the skin is not impaired. As it is not uncommon to have an accumulation of serum develop around the buried graft, sutures may give way and slight infection may take place without impairing the success of the graft. These minor complications, however, in the case of inlays buried through an incision in the eyelid skin may lead to granulations and scarring, and in rare instances epithelialized fistulae have developed necessitating operative excision and closure.

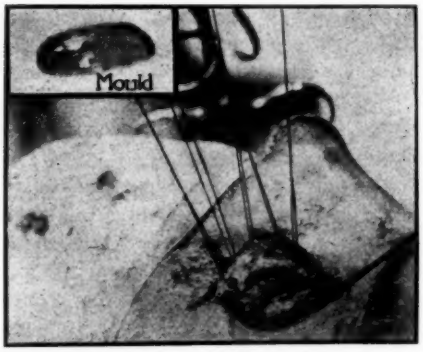
2. The exact position, depth and width of the new fornix may be better outlined by an initial incision through the conjunctiva than by undercutting from the skin side to a point just beneath the surface of the conjunctiva. In our experiences, the incision may also be made closer to the tarsal plate by operating through the conjunctiva.

3. The depth and direction of the cavity can be readily determined according to the necessity of the individual case and the graft covered mould more readily maintained in the desired position. A diagramatic chart of this method is shown in Fig. 1, and actual photographs of the operation in Fig. 2. Fig. 3 shows a restoration of the lower conjunctival sac.

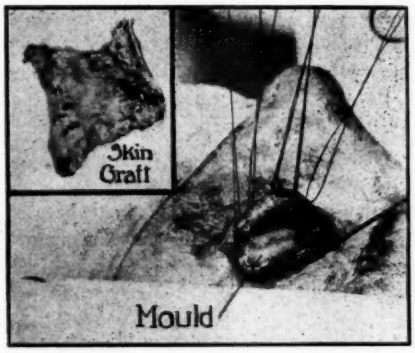
Fig. 1. The author's modification of Esser's method of restoring the conjunctival sac.

The Surgical Restoration of the Eyelids by Skin Grafting.—The Esser method of skin grafting may be variously modified for the treatment of cutaneous deficiencies of the eyelids resulting from wounds or burns. In these cases there is usually present a varying degree of ectropien of the upper or lower lids. There may be difficulty experienced in closing the eye, and in the burn cases the inner canthus is often drawn forward 3 or 4 mms. by the contraction of the skin over the bridge of the nose.

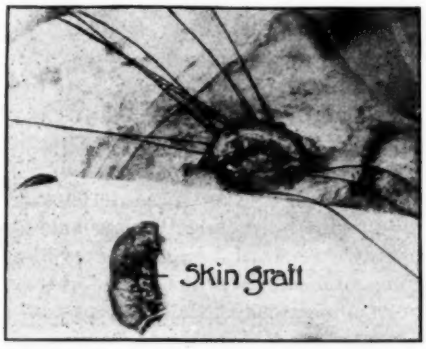
Two modifications of the Esser process have been made by Major H. D. Gillies of the Queen's Hospital. The first method may be conveniently termed an *Outlay* in that the graft covered mould is buried in the subcutaneous tissues of the eyelid through an incision in the skin and is removed through the same incision. The skin grafted cavity thus produced is laid open and forms a skin covering to the eyelid. The increase of the eyelid skin corresponds to the extent of the grafted area. In burn cases it is usually necessary to increase the skin covering more particularly in a vertical direction. As a general rule the undercutting is continued until the lid margins may be readily drawn past their normal position when the eyes are closed. The position of the incision and the extent of the undercutting varies with the individual case according to the degree and position of ectropian, scars, etc. The incision is usually horizontal, following closely the margin of the tarsus and frequently extends from canthus to canthus. In the undercutting and shaping of the mould, attempt is made to make the surfaces rounded and to avoid sharp angles and pockets. The mould is fashioned of sufficient length, size and shape to permit the margins



Lower conjunctival sac reproduced by undercutting; mould of cavity thus formed.



Dental impresion compound mould fitted in position.



Sutures retracting margins of incision. Skin graft wrapped around mould.

Mould and skin graft being buried in position by tieing sutures.

Fig. 2. Photographs of the actual operation for enlarging the conjunctival sac of patient shown in Fig. 3.

of the incision to be drawn together over it with slight tension. The mould is then covered with a Thiersch graft and held in place by uniting the margins of the incision. It is not uncommon to have a collection of serous exudate appear in four or five days, or the sutures may give way and the dental compound come away within a week or ten days after insertion. These complications have not in our experience had any deleterious effect upon the Thiersch graft. It is particularly important in these outlay grafts that the Thiersch be cut in one piece and as uniformly even and as thin as possible. The thicker grafts do not give the same elasticity to the eyelid and variations in thickness are noticeable for some time. It is also important to have the graft approach as nearly as possible to the cut margins of the incision. The position of the incisions and extent of undercutting will, of course, vary in the localized eyelid deformities resulting from scar contraction according to the amount, position and direction of the skin to be replaced. Figs. 4, 5 and 7.

The second method may be termed, *The Epithelial Overlay.* This differs from the *Outlay* method in that the mould is not fitted in such a way that it may be buried and the margins of the incision brought over it, but is applied and fitted over the entire raw area. The skin graft is therefore applied to its under surface only and not wrapped around it as in the case of outlay grafting. The mould is then held firmly in position by sutures passing over it from the margins of the incision. This overlay method is more universally applicable to eyelid skin deficiencies than is the outlay method. Post operative discomfort is less, pocketing of the ends of the grafted area is rare and the early and later cosmetic and functional results seem to be better. Latterly, I resorted to the Overlay method in most cases with extensive or

Fig. 3. The inferior conjunctival sac restored by skin grafting according to the method shown in Figs. 1 and 2.

localized eyelid skin deficiencies. It is also of great service in the more extensive injuries of the lids which are accompanied by loss of tissue, displacement and adhesions. In these cases extensive undercutting may be necessary before the remains of the eyelid can be brought to the normal position. Consequently the covering in of a graft-covered mould by the Outlay method would be impossible. The remains of the eyelid may then be sewn in a favorable position, scars excised and an impression taken of the entire raw area: A Thiersch graft is then applied to the raw area and held firmly in place by means of the compound impression. The mould is held in position by suturing, adhesive strapping or bandaging and is left undisturbed for ten or twelve days. The overlay method is also very useful in displacements about the inner canthus where, if an outlay be used, there is some difficulty in eradicating the hollow produced. After the scar tissue is removed and bands and adhesions are divided permitting the lids and canthus to resume a normal level and position, the parts are pressed firmly to position by means of impression compound, the under surface of which is covered

Fig. 4. *The Outlay* method of eyelid restoration ten days after operation on all four lids. The dental compound moulds are beginning to extrude. Final results shown in Fig. 5.

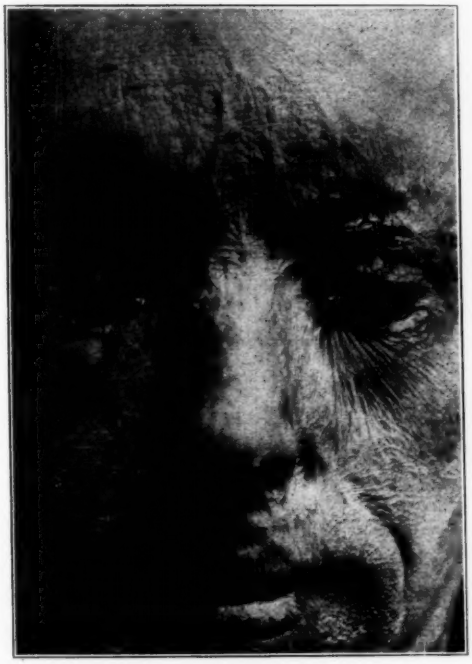


Fig. 5. Restoration of the eyelid skin of all four lids by the *Outlay* method of skin grafting. In this case the maximum increase in cutaneous surface was as follows:

	Horizontal	Vertical
Right upper eyelid.....	2.5 cms.	1.2 cms.
Right lower eyelid.....	2.4 cms.	1.2 cms.
Left upper eyelid.....	2.5 cms.	1.0 cms.
Left lower eyelid.....	3.1 cms.	1.8 cms.

by graft to the necessary extent. By this procedure the employment of pedunculated flaps

Fig. 7. Marked ectropian of all four eyelids following burns. The right upper and left lower lids have been incompletely restored by the *Outlay* method.

may be avoided in many cases, (Figs. 6, 7 and 8.)

Figs. 8 and 9. Final result of case shown in Fig. 6. Carried to completion by the *Overlay* method. Even larger areas of eyelid skin were restored in this patient than in patient shown in Figs. 4 and 5. Function completely restored.

One rule cannot be too strongly emphasized

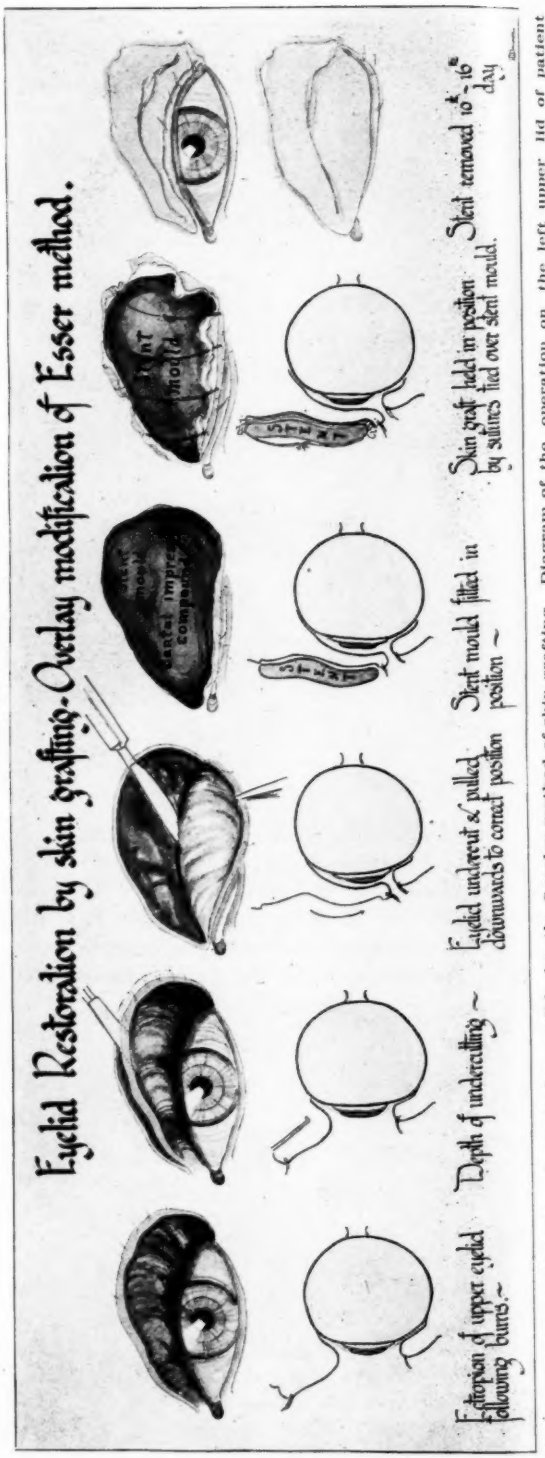

Eyelid Restoration by skin grafting-Overlay modification of Esser method.
Ectropion of upper eyelid following burns.
Depth of undercutting
Eyelid undercut & pulled downwards to correct position
Stent mould fitted in position
Skin graft held in position by sutures tied over stent mould.
Stent removed 10-16 day

Fig. 6. The operative steps in restoring eyelids by the *Overlay* method of skin grafting. Diagram of the operation on the left upper lid of patient

and that is, *Patience Must be the Watchword of the Plastic Surgeon.* Many failures have resulted from operating at too early a date after the initial injury and from over anxiety and haste in performing subsequent operations before sufficient time has elapsed. By so doing the tissues are not given a fair chance to recover their blood supply, overcome any infection present and become soft and elastic. As a general rule, three months should elapse after a wound has become healed over before plastic operative procedures are undertaken and a similar interval of time should be allowed to pass between operations. Corneal involvements or other complications particularly in burn cases with ectropian may, however, necessitate earlier and more frequent operative interference. It has been noticed that skin grafts of the eyelids in burn cases take better, look better and show less reaction following operation when the surgeon has waited many months until the marked hyperemia present in the early stages has more or less disappeared. It can be truly stated, "More haste, less speed." War experience furnished these lessons aplenty, and we should study and apply them to plastic surgery in civil practice.

933 Metropolitan Bank Building.

BIBLIOGRAPHY

1. Davis, Staige: A Comparison of the permanence of free transplants of bone and cartilage. Annals of Surgery, Vol. LXV, No. 2, Feb. 1917.
2. Gillies, H. D.: Plastic Operations of the Eyelids. Transactions Opthalmological Soc. Vol. XXXVIII, 1918.
3. Esser, J. F.: Studies in Plastic Surgery of the Face. Annals of Surgery, Vol. LXV, No. 3, March 1917.

Fig. 6. The operative steps in restoring eyelids by the *Overlay* method of skin grafting. Diagram of the operation on the left upper lid of patient

THE USE OF SPLINTS IN SPINE INJURIES*

H. Winnett Orr.
Lincoln, Nebraska.

The treatment of spine injuries of all grades of severity is usually poorly done. There is a great deal of prolonged and permanent disability due to spine injuries which should have been relieved almost at once if patients were treated by ideal rest. The responsibility for this disability rests almost entirely upon the surgeon or physician who sees the patients at first.

The writer desires to call attention to certain measures which have been found to be curative in many cases and very helpful in others. One must remember that spine injuries cause disability in one of three ways: first, strain; second, fractures; third, infection and inflammation following one or both of the preceding.

Occasional theoretical excursions to the contrary, notwithstanding, the indication in all these cases is for rest. Crimes are being committed daily in the name of massage, manipulations "adjustments" and exercise.

Inefficient treatment often rests upon the fact that a patient with a spine injury is said to have been put at rest if he is sent to bed. This indicates a very inadequate conception of the meaning of rest such as is required for an injured bone or joint. The kind of rest required is that which may be secured only by the perfect fixation of all parts adjacent to a spine injury. Movements of the injured or strained parts must be reduced to a minimum.

When the injury is in the upper dorsal or cervical region, fixation of the trunk with the head included is necessary. If the injury is in the lumbar or lumbosacral region, fixation of the lower extremities with the trunk will be required. This may raise the question which almost always comes up, whether fixation of an injured joint may contribute to stiffness or ankylosis. This question has been agitated again by the teachings of Willens as to the treatment of injuries of suppurating joints.

The moving of injured knees may have done good in a few cases. It has done harm in a great many. My own treatment for the spine and other bone and joint conditions rests upon the premise that stiffness and ankylosis depend upon one thing only and that is pathology—and that pathology is minimized by rest. The same rules should be applied to spine injuries that apply in all other fractures and injuries to joints. The injured parts should be restored as nearly as possible to normal position, under anesthetic usually, and then a fixation device should be put on which will absolutely protect the parts against movement.

This fixation device should, in the trunk, be left on for from six to twelve weeks. In fractures of the bone without injury to the cord good results

*Read before the Southern Minnesota Medical Assn., Mankato, November, 1920.

may regularly be obtained in this way. Otherwise disability is quite likely to be prolonged. The same rules apply with even greater force in fractures with damage to the cord.

We may have a complication presented along with the spine fracture comparable to a peripheral nerve injury. There arise in these cases, questions of partial paralysis and contracture deformity as muscle power returns. There are often nutritional or trophic disturbances. In the latter class of cases replacement of injured parts and fixation are necessary at once. The patient can be managed much better in an adequate splint. In addition thigh adduction, knee flexion and foot drop must all be prevented or corrected.

There are only two devices that I know of that are adequate to meet this situation. These are the double abduction Thomas splint and plaster paris. My own preferences is for the latter. Plaster paris can be used either as a complete cast or as a plaster bed.

Four recent cases in adults past thirty in private practice and about five or six in my military service have impressed me with the fact that neglected spine injuries often lead to a destructive osteo-arthritis. This is a condition which was thoroughly discussed by Dr. Gillette of St. Paul almost twenty years ago.

These are usually tuberculous lesions of the vertebrae. Rather commonly also after traumatisms we have symptoms of chronic arthritis due to strain or other infectious forms of osteo-arthritis. It is my belief that not only about 90 per cent of the tuberculous lesions but almost all other spine disability might be prevented by the immediate application of a plaster jacket or an efficient spine brace.

CONCLUSIONS

First—Bone and joint injuries to the spine call for immediate adequate immobilization of the injured parts.

Second—The period of immobilization must be somewhat longer than for similar injuries in the extremities.

Third—During the time the patient is in bed a Bradford frame; a double Thomas abduction splint or plaster paris should be worn.

Fourth—For a continuation of treatment a plaster paris jacket or a Ridlon or Taylor spine brace may be used.

Fifth—Much disability and even more serious consequences will be prevented in this way.

DISCUSSION

DR. EMIL S. GEIST, Minneapolis: The subject of fracture of the spine as presented by the essayist is a very important one. Dr. Orr did not emphasize, but I should like to do so, that fracture of the spine without paralysis is not an uncommon thing to see. The more we study cases of injury to the spine, either direct or indirect injury, the more we realize that fracture of the spine without paralysis is frequent—comparatively frequent at least. For instance, during the three weeks of last month I saw three cases. I saw in Chicago a few days ago three x-ray plates brought to Potter's laboratory within the last twenty-four hours, all of them cases of fracture of the spine without paralysis. This type of case causes painful spine for a long time afterward and is the cause of a great deal of disability. The recognition of this is especially important, in industrial work. A lot of the disability is due to the fact that these cases are not diagnosed and are not treated by adequate fixation as Dr. Orr has outlined. In other words, these cases ought to be properly diagnosed by the x-ray and properly treated at the time of the injury. Lateral x-ray pictures are frequently not made, and it has been my experience that as a result of this neglect many cases are overlooked. If these cases are not properly treated, and often even in spite of the best treatment, many of them will continue to be painful and present painful symptoms.

These old painful cases are candidates for a fixation operation. We have done that in a considerable number of such cases.

DR. H. W. MEYERDING, Rochester: I know that we all appreciate Dr. Orr coming here and giving us this splendid paper, and we are greatly indebted to him for the excellent slides he has shown.

I agree with Dr. Geist that it is the orthopedist who sees and receives cases of fracture of the spine without nerve injury. Some neurologists believe that it is rare to have fracture of the spine without involvement of the cord, yet in my experience it is not infrequent.

The double spica cast of which Dr. Orr showed a slide is a very efficient means of fixation, and one which we use in practically all cases of fracture in the lower spine. If there is cord involvement, it is essential that foot drop be prevented, as there is a tendency to contraction of the tendo Achilles and later production of talipes equinus.

Recently a patient was brought to our Clinic who had a fracture with cord involvement. He had recovered from the damage to the cord after two years in bed, and came to see if something could not be done to get him on his feet. At operation the tendo Achillis was lengthened and within an hour he was walking about in a plaster cast with the aid of crutches.

Dr. Orr brought out the point that we must hold the parts in a position of anatomic rest. The method of fixation discussed is very valuable also in cases of anterior poliomyelitis. Contracture deformity can

practically always be prevented by proper fixation in casts or braces. A great deal of orthopedic surgery results from these contracture deformities. Extension of the head by weights and by having the body lower than the head is also very valuable, and can be aided by such technic as the sheet over an oil cloth so that the body tends to slip down. In several cases of long standing pain following fracture without cord involvement Dr. Brackett performed bone graft operations. For a patient who has suffered as long as seven years, with a disability, or if pain persists for more than one year, a bone graft should be considered. I think as reports come in during the next few years we will find many references to the question of trauma in relation to tuberculosis. I mentioned the subject once in this society and once in the state association in reporting spine and hip disease. Dr. Wilcox asked whether I had ever seen tuberculosis caused by trauma, and I answered in the negative. Trauma causes lowered resistance by which means the tuberculosis bacilli already in the system have an opportunity to form a new focus.

The point brought out by Dr. Geist of a roentgenogram with the patient in the lateral position is important.

I wish to add a word or two about the Thomas splint. This splint should be placed on every ambulance and should be carried as an emergency dressing by practically every physician, since at any time he may be called on to bring to the hospital a patient with a compound comminuted fracture of the femur. A Thomas splint to slide on the patient and tie onto the shoe will save the patient a great deal of shock and may save his life.

DR. C. E. RUTH, Des Moines, Iowa: I would like to ask Dr. Orr to tell us his experience of the value of prolonged and heavy extention in cases of fracture of the spine in which there is the development of deformity sometimes of extreme degree. I ask this question because of some experience we had at General Hospital No. 2. I recall a case that came in from overseas doubled up at an angle of nearly 90 degrees and under prolonged extension he was gradually unraveled and straightened out and a cast put on during suspension from the head. The result was extremely satisfactory. The pain and all deformity vanished. This was mentioned by Dr. Meyerding, but I would like Dr. Orr's opinion with reference to his experience in regard to it.

DR. ORR (closing the discussion): With regard to the point raised by Dr. Ruth, I have often used head extension in the manner suggested by him and regard it as highly important in lesions well up in the spine. Even in the old cases with much muscle spasm a period of head traction will be a great factor in correcting the deformity. About eight to fifteen pounds should be used with the head of the bed raised eight to twelve inches.

STUDIES ON THE RESPIRATORY ORGANS IN HEALTH AND DISEASE*

I. A VALUABLE AID IN THE DIAGNOSIS OF EARLY TUBERCULOSIS

J. A. MYERS, Ph. D., M. D.
Minneapolis, Minn.

In the field of tuberculosis there is nothing more helpful to both physician and patient than the diagnosis of the disease in its early stage. Following such diagnosis the physician sees the possibility of restoring a high percentage of his cases to a reasonable working capacity. The patient is at once made aware of the fact that he has a terrific battle to fight and yet he is grateful for the discovery of the disease while the prognosis is good.

In cases which show questionable physical signs or symptoms it has long been the practice to examine microscopically the excreta or the body fluids in question. When the microscopic examination was negative small amounts of the suspected material were injected into laboratory animals (usually the guinea pig). Such injections were first made into the peritoneal cavity where it often took from four to six weeks, in positive cases, for the disease to manifest itself. The methods of inoculating laboratory animals have been considerably modified from time to time, but the one now employed at the Saranac Laboratory is so valuable that it should be brought to the attention of every clinician who is in any way engaged in the fight against tuberculosis.

This method is so simple that it requires no laboratory skill and can even be performed without the usual laboratory facilities. About one half cubic centimeter of the suspected material such as sputum is injected subcutaneously into the inguinal region of a guinea pig. In most of the positive cases in approximately ten to fourteen days the inguinal lymph nodes on the side of the injection become markedly enlarged and palpable. It is not necessary to section and study these nodes microscopically since so many have been studied in this way and the findings are usually those of a tuberculous lesion. To confirm the diagnosis, however, the hair is shaved from a small area, pre-

*From the Department of Internal Medicine, University of Minnesota and the Minneapolis General Hospital, Minneapolis.

ferably the side of the pig and .005 of a centimeter of Kochs Old Tuberculin is injected into the skin (made by diluting 0.5 cubic centimeter of Koch's Old Tuberculin with 9.5 cubic centimeters of normal saline containing one-fourth of one per cent phenol. Of this solution 0.1 cubic centimeter contains 0.005 cubic centimeter of tuberculin.) In six to forty-eight hours, in the positive cases a local reaction is manifested around the site of the injection in the form of a beautiful hyperemic zone. The animals which show negative lymph nodes and a negative tuberculin test are kept under observation for several days and tuberculin tests repeated, however, if the test does not become positive within a few days after the second week one is quite safe in reporting a negative diagnosis.

It has been shown that the guinea pig even when kept in captivity does not often spontaneously contract tuberculosis, however in order to rule out possible error it is best to keep a few pigs in stock which are known to be negative to the tuberculin test.

The following two cases are cited to emphasize the value of the inoculation test:—

Case 1.—A young man gave a history of tuberculous cervical nodes on the left side which were exercised in childhood. The physical examination of his chest showed slightly impaired resonance to the second rib. A fluoroscopic examination revealed slight shading of the same area. All other physical signs were negative. There were no symptoms of active pulmonary tuberculosis. His left ear began discharging several months before the examination and a slight discharge persisted.. Stained smears made from the aural discharge revealed no tubercle bacilli. A biopsy showed a suspicious tuberculous lesion. A small amount of the discharge was injected into the inguinal region of a guinea pig. Ten days later the inguinal nodes were palpable. At the end of the twelfth day the pig gave a negative reaction to the tuberculin test. When repeated on the fourteenth day, however, the tuberculin test was positive. The pig died of bronchopneumonia a few days later and stained smears made from the inguinal nodes showed numerous tubercle bacilli.

Case 2.—A man of twenty-seven years, with an average weight of 190 pounds, who always had excellent chest expansion and lung capacity developed a "cold" three months ago. He continued working but was occasionally conscious of increased temperature. About three days before he was first seen he had a slight hemoptysis which came on after he had indulged in considerable singing. His temperature was 100.6°, pulse 96 per minute and hemoglobin 70 per cent. The physical examination showed the excursion slightly decreased below the second rib, tactile fremitus increased over same area with very little change in the percussion note. Moderately coarse rales were elicited over the lower two thirds of the right lung, anteriorly. Fluoroscopic examination revealed considerable shading of the right middle lobe. Stereoscopic plates revealed the following: "The right middle lobe showed a soft homogeneous consolidation, diminishing in intensity toward the periphery. Near the top of this consolidation near the anterior wall is a ragged cavity." "The outstanding feature is the right middle lobe consolidation was cavity formation. It represents either an acute tuberculosis or an acute pulmonary abscess. The weight of evidence is in favor of the abscess." Microscopic examinations of the sputum revealed no tubercule bacilli.

The active lesion being located in the "non-tuberculous field of the lung," the x-ray findings and the apparent absence of tubercle bacilli in the sputum made a diagnosis of tuberculosis somewhat questionable, nevertheless the patient was placed on a very strict antituberculous regimen. A three day specimen of sputum was collected, one-half cubic centimeter was injected subcutaneously into the inguinal region of a guinea pig. On the ninth day the inguinal nodes were palpable and on the tenth day the tuberculin test was negative. On the fifteenth day, however, the tuberculin test was very positive. Five weeks after the sputum was injected the animal died and the autopsy showed that in addition to the enlargement of the lymph nodes the spleen, liver and lungs were studded with tubercles.

This test is easily performed, is accurate and often enables one to make a diagnosis from several days to weeks before it could otherwise be made. Since early recognition is of such vast importance in tuberculosis this test deserves to be more frequently employed.

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Vol. IV August, 1921 No. 8

EDITORIAL

ORGANIZED MEDICINE

Since the organization of the American Medical Association in 1848, the development of this Association has been phenomenal. Composed as it is of the component County and State societies, the organization makes for efficiency and is destined to remain perhaps the leading medical association of the world.

The purposes for which the American Medical Association was organized are too well known to require comment, and yet it may be well to pause at times and consider how we may best carry out the ideals which are the aim of this association.

The organization will gain in strength and approach its ideals in direct proportion to the manner in which its integral parts develop, and without the development of the County and State societies, the American Medical Association must fail to advance. The present era has witnessed the development of a multiplicity of medical societies, each with its special function to perform, thus pointing to a sincere desire on the part of physicians to exchange with each other all of the scientific knowledge which they have been able to acquire.

Some associations have been formed of those doing special lines of work, and some upon lines that are purely geographical. While all associations are dependent largely for success upon the inherent worth of their members, success of the "geographic" organizations is dependent more especially upon the dynamic force of some one or more of its members, and we see numerous examples of this fact, one of the most striking perhaps appearing in our own State. Excellent programs, composed largely of outside talent, serve to bring to these meetings large and enthusiastic audiences, with great benefit to all concerned.

The County and State societies, as well as the mother society, the American Medical Association, comprehends a somewhat different function from a number of standpoints. We have in mind especially the development of the individual members of these associations, and in this manner, the society as a whole. The County and State societies must act as the training school for the national organization.

The introduction of too much foreign talent into these meetings, while it might apparently bring immediate temporary success, can not fail to have an inhibitory effect upon the younger members of these organizations, and to a marked degree, retard their development. The success of the State associations must depend largely upon the sum total of the output of its individual members, that is, by the excellence of the program which the association itself is able to produce.

With this idea in mind we would suggest greater care, and the expenditure of more time in the preparation of the program for State meetings, and while everyone desiring to be heard should have an opportunity we believe it would be well to make an effort to exhibit the best material which our State association can contribute. Possibly the program committee should be given a longer tenure of office in order to bring this about. The writers of papers should be selected many months before the Association meets. This would insure excellent programs of absorbing interest, and with the officers of the Association functioning properly, keeping the essayists well within their time limit, and arranging for short and snappy discussions, the State Medical Associa-

tion should have no difficulty in performing the function for which it was established.

There is another duty, however, which falls upon each and every member of the Association, and that is the duty of attending the State Convention whenever it lies within his power to do so. It is obvious that but a small percentage of the membership can or will take part in the preparation and discussion of scientific papers. The remaining members should, at the very least, attend the Convention, not only because it is a patriotic duty, but for personal benefit which is sure to be derived from such attendance. The hospitality of the City of Duluth, which has the honor of entertaining the Association this year, is not to be excelled. The officers of the Association are entitled to the support of every member, and their names alone insure the excellence of the program. Every member of the State society should take advantage of this opportunity to enjoy a short vacation and a scientific treat.

CHEMICAL PRODUCTION IN AMERICA

It is highly desirable that the pre-war world monopoly in certain branches of the chemical and drug business held by Germany, shall not be regained. As a result of war necessity our infant chemical industries grew tremendously. The manufacture of high explosives was of vital necessity; the production of dyes, which industry had been held as a world monopoly by Germany, became necessary; in the production of certain drugs, such as aspirin, atophan and salvarsan, many of which are coal tar derivatives and were highly essential to the nation's health, had to be developed in a comparatively short time. The unavoidable delay in the development of these fields in chemistry, which are so closely associated in a productive way, was costly.

The chemical industry of the country is much disturbed at the present, and rightly so, at the prospect of Germany regaining her former position through cheaper production and patronage by the German government. For years the law in Germany required an "arbeit" of the young men in the chemical and medical profession, and, these thousands of researches have resulted in a corresponding development of the chemical and medical activities. Government assistance made it possible for six large chemical concerns to develop with an output sufficient to supply an enormous foreign trade. It has been shown how it was possible with production on such a large scale to cut prices temporarily in foreign countries whereever competition arose and thus prevent rivals from doing business. This German industry is likely to strangle our newly developed industry unless government aid in the form of protective tariff, an actual embargo on German products, or encouragement of chemical research is instituted. This is an economic question and must be decided at Washington.

At the risk of crying "Wolf! Wolf!" we wish to call attention to the use of chemicals in the last war in the form of high explosives and poisonous gasses. There is every indication that in any future war involving an educated (we purposely avoid the term civilized) nation, chemicals will be more generally used. What the future in chemical warfare holds, is food for the most fantastic imagination. Poisons are known three drops of which coming in contact with the skin will cause death. An ounce of dipheny-chlor-arsine explodes continuously for a period of weeks. What next?

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

MINNESOTA STATE MEDICAL ASSOCIATION ANNUAL MEETING

August 24, 25, 26, 1921 Central High School, Duluth, Minnesota

PROGRAM

Thursday, August 25th

9:00 A. M.

MEDICAL SECTION

S. H. Boyer, M. D., Chairman; Charles B. Wright, M. D., Secretary

1. "Duodenal Ulcer Treatment, Late Results"—Thomas R. Martin, M. D., Duluth.

2. "The Etiology and Laboratory Diagnosis of Actinomycosis"—A. H. Sanford, M. D., T. B. Magath, M. D., Rochester.

3. "Anaphylaxis to Food Proteins in Breast-Fed Infants and its Probable Relation to Certain Diseases of the Nursing Infant Especially Exudative Diathesis"—W. Ray Shannon, M. D., St. Paul.

4. "Dermatology and Internal Medicine"—S. E. Sweitzer, M. D., Minneapolis.

5. "Carcinoma of the Lung; a Study of its Incidence, Pathology and Clinical Important with Report of 13 Cases Studied at Necropsy"—Moses Barron, M. D., Minneapolis.

6. "Differential Diagnosis between Tuberculosis and other Lung Conditions"—Frank Spicer, M. D., Duluth.

7. "Referred Pain in Heart Disease"—Charles N. Hensel, M. D., St. Paul.

8. "The Differential Diagnosis between Mixedema Mongolian Idiocy, Rickets and Congenital Syphilis, with Special Reference to the X-ray as a Diagnostic Aid"—T. L. Birnberg, M. D., St. Paul.

AUGUST 25, 9:00 A. M.

SURGICAL SECTION

J. T. Rogers, M. D., Chairman; T. L. Chapman, M. D., Secretary.

1. "Ulcer of the Bladder and its Surgical Treatment"—Verne C. Hunt, M. D., Rochester.

2. "Cystocele and Prolapse"—Robert Earl, M. D., St. Paul.

3. "The Surgical Treatment of Painful Scars"—J. F. Corbett, M. D., Minneapolis.

4. "Treatment of Tuberculosis of Spine"—Wallace H. Cole, M. D., St. Paul.

5. "Suspensions and Tractions in the Treatment of Fractures"—A. W. Ide, M. D., B. I. Derauf, M. D., Brainerd.

6. "Urinary Lithiasis in Childhood and Infancy"—Gilbert J. Thomas, M. D., Minneapolis.

7. "Blastomycosis; Clinical Pathology and Therapeusis"—Benjamin Davis, M. D., Duluth.

8. "Pyernia of Otitic Origin"—(To be read by proxy)—Horace Newhart, M. D., Minneapolis.

Afternoon Session—August 25th

Joint Meeting Medical and Surgical Sections.

Call to Order, 2:00 P. M.

1. Address of Welcome—Mayor S. F. Snively, Duluth.

2. Presidential Address "Minnesota Medicine in the Making—Personal Reminiscences"—C. Eugene Riggs, M. D., St. Paul.

3. "Diagnosis of Breast Tumors at the Exploratory Incision"—Joseph Bloodgood, M. D., Baltimore.

4. Intestinal Polypi and Their Relation to Carcinoma.—Margaret Warwick, M. D., St. Paul.

THE ANNUAL BANQUET

Thursday Night, 6:30 Sharp

MASONIC TEMPLE

THIRD DAY—FRIDAY, AUGUST 26th

9:00 A. M.

MEDICAL SECTION

1. "The Vital Capacity of the Lungs in Cardiac Disease"—Henry L. Ulrich, M. D., Morris H. Nathanson, M. D., Minneapolis.

2. "The Results in Treatment of Inflammatory Diseases of the Gall Bladder and its Ducts"—Orville N. Meland, M. D., Warren.

3. "Hysterical Dysphagia"—Porter P. Vinson, M. D., Rochester.

4. "Arteriosclerosis of the Nervous System"—Henry W. Woltman, M. D., Rochester.

5. "Manifestations of the Spasmophilic Diasthesis in Older Children"—C. A. Scherer, M. D., Duluth.

6. "A Comparison of Lung Capacity Readings and Physical Signs in Pulmonary Tuberculosis"—J. A. Myers, M. D., Minneapolis.

7. "Report of an Epidemic of Paratyphoid Fever Among University Students"—C. A. McKinley, M. D., Minneapolis.

8. "Mental Hygiene and the General Practitioner"—J. C. Michael, M. D., Minneapolis.

AUGUST 26th—9:00 A. M.

SURGICAL SECTION

1. "The Treatment of Pericarditis with Effusion"—Carl Hedblom, M. D., Rochester.

2. "Potter Version"—W. A. Coventry, M. D., Duluth.

3. "Principles Governing the Treatment of Fractures"—E. K. Green, M. D., Minneapolis.

4. "Marginal and Jejunal Ulcers Following Gastro-Enterostomy"—F. C. Schuldt, M. D., St. Paul.

5. "Circulatory Foot Disturbance"—Emil S. Geist, M. D., Minneapolis.

6. "Goiter Surgery"—F. J. Plondke, M. D., St. Paul.

7. "The Open Treatment of Fractures"—A. F. Schmitt, M. D., Mankato.

8. "Cosmetic Rhinoplasty"—J. D. Lewis, M. D., Minneapolis.

Afternoon Session—August 26th.

Joint Meeting Medical and Surgical Sections.

1. The Relief of Jaundice Due To Pancreatic Obstruction.—C. H. Mayo, M. D., Rochester.

2. "The Clinical Estimate of Myocardial Damage"—S. Marx White, M. D., Minneapolis.

3. "The Gall Bladder as the Source of Focal Infection"—B. S. Adams, M. D., Hibbing.

4. Report of the House of Delegates.

5. Installation of the President.

THE SECOND INTERNATIONAL CONGRESS OF EUGENICS

Planns on a rather extensive scale are being made for this Congress which will meet at the American Museum of Natural History, New York City, September 22d-28th, 1921. While the program has not as yet been announced, the list of those invited to present papers includes many names of international prominence, a considerable proportion being medical men.

The congress is divided into sections which will consider various phases of eugenics such as: the results of research, factors which influence the birth date, human racial differences, and the relation of eugenice to the state.

The fifty-third annual meeting of the Wabasha County Medical Society was held in Plainview, July 7, 1921. The following program was presented:

Cancer of the Rectum Operated on by the Electro-Coagulation Method—Dr. G. Schmidt, Lake City.

The Treatment of Anemia—Dr. J. P. Schneider, Minneapolis.

The Tuberculous Patient—Dr. W. K. Quackenbush, Wabasha.

Dislocation of the Lower Radio-Ulnar Articulation—Dr. E. H. Bayley, Lake City.

A hearty vote of thanks was extended by the members present to Dr. J. P. Schneider of Minneapolis for his helpful address, to the visiting physicians of the Mayo Clinic Staff for taking part in the discussions, and to Dr. and Mrs. Slocumb, and all others helping in the entertainmet of the society.

24th Annual Meeting of the Medical Library Association

The 24th Annual Meeting of the Medical Library Association, whose membership includes all of the larger medical libraries of the country, and a large number of individual members, consisting of those interested in furthering medical library work, was held in Boston June 6, 7, 8, 1921. The business meetings of the Association were held in the Boston Medical Library. In addition to the address of the President the program contained the report of a committee on Standard Classifications, and the system used in the Boston Medical Library, and this as explained by the Chairman, Mr. James F. Ballard, was adopted, as being the most practical solution for meeting the perplexing problems of classiffication. This was followed by a discussion on Reference Aids, which was opened by Mrs. Grace W. Myers, of the Treadwell Library of the Massachusetts General Hospital. An evening meeting, which was largely attended, was addressed by the President, Dr. John W. Farlow, of the Boston Medical Library. This was followed by an interesting paper, illustrated by lantern slides, by Dr. George S.Huntington, of New York City, entitled "Some historical facts concerning the catoptron of Johannes Remmelinus, and the superimposed anatomical plate during the early part of the 171th century." Following this Dr. Malcolm Storer, of Boston, read a paper entitled "Interesting medical medals."

The permanent headquarters of the Medical Library Association are in the Medical and Chirurgical Faculty Building, at 1211 Cathedral Street, Baltimore, Maryland.

NEWS OF THE HOSPITALS

The Isle hospital at Isle, Minn., has filed articles of incorporation. The capital stock is $10,000.

On the night of July 11th Dr. George K. Hagaman awarded diaplomas to seven graduate nurses at the Childrens Home 2239 Commonwealth Ave., St. Paul

Of the seventy-eight operations recently performed by Colonel Henry Smith at St. Joseph's Hospital St. Paul, seventy-four have been reported a complete success.

Adah H. Patterson, superintendent of St. Luke's Hospital, St. Paul, has been spending her vacation in Canada. Dr. A. R. Colvin, of the staff, was recently absent for a few days on an outing at Lindstrom Minn.

Miss Leila Halverson, superintendent of St Paul Hospital was recently absent on her vacation in North Dakota. The hospital is contemplating an extensive addition to its X-Ray Department in the near future.

The Northwestern Medical and Surgical association at a meeting at Brainerd authorized an increase in capital stock from $50,000 to $150,000. Amendments to the articles of incorporation, filed in the office of Mike Holm, secretary of state, today provided for such an increase.

MINNESOTA STATE BOARD OF MEDICAL EXAMINERS

PHYSICIANS LICENSED AT THE JUNE (1921) EXAMINATION TO PRACTICE IN THE STATE OF MINNESOTA

BY EXAMINATION

NAME	WHERE AND WHEN GRADUATED	RESIDENCE
Ahlfs, Jacob Johnson	U. of Minn., M. B., 1921	St. Paul, Minn., St. Luke's Hospital.
Anderson, Frank William	Harvard, M. D., 1918	Rochester, Minn.
Bayard, Harry Fred	U. of Minn., M. B., 1921	St. Paul, Minn., 728 Cherokee Ave.
Bessesen, Alfred Nicholas, Jr.	U. of Minn., M. B., 1921	Minneapolis, Minn., 1001 W. 36th St.
Bessesen, Daniel H.	U. of Minn., M. B., 1921	Minneapolis, Minn., 1001 W. 36th St.
Blosmo, Oscar J.	U. of Minn., M. B., 1921	Minneapolis, Minn., 316 Leamington.
Boyd, Julian Deigh	U. of Iowa, M. D., 1921	Caledonia, Minn.
Bratrude, Earl Jeffrey	U. of Minn., M. B., 1921	Minneapolis, Minn., General Hospital.
Brown, Alex. Edward	U. of Minn., M. B., 1921	St. Paul, Minn., 9 West Delos St.
Bulkley, Kenneth	Columbia U., M. D., 1909	Minneapolis, Minn., 420 Syndicate Bdg.
Dittrich, Raymond Joseph	U. of Minn., M. B., 1921	New Ulm, Minn.
Eder, Howard Leslie	U. of Minn., M. B., 1921	Blue Earth, Minn.
Engelhart, Peter Clarence	U. of Minn., M. B., 1921	Minneapolis, Minn., 629 Wash. Av. SE.
Freymiller, Ernest Fred	U. of Minn., M. B., 1921	Minneapolis, Minn., 1138- 14th Av. SE
Fritz, Haeberlin	(U. of Lausanne, 1920) (U. of Zurich, 1919)	St. Paul, Minn., Piedmont Apt. 36 B.
Frudenfeld, Henry H.	U. of Ill., M. D., 1902	Minneapolis, Minn., 4912 Harriet Av.
Gamble, Ross Merrill	U. of Minn., M. B., 1921	Minneapolis, Minn., 429 Union St. SE.
Geyman, Milton John	U. of Minn., M. B., 1921	Minneapolis, Minn., 509 E. River Rd.
Haeberlin, Fritz		Remer, Minn.
Hanson, Elmer C.	U. of Minn., M. B., 1921	Minneapolis, Minn., Swedish Hospital.
Hanson, William Arthur	U. of Minn., M. B., 1920	Rochester, Minn.
Harbo, Harold Eyvind	U. of Minn., M. B., 1921	Minneapolis, Minn., 730 22nd Av. So.
Hauser, Emil Dan. Wm.	U. of Minn., M. B., 1921	Minneapolis, Minn., 2924 Girard Av. S.
Hauser, Louis Arthur	U. of Minn., M. B., 1921	St. Paul, Minn., 914 Lowry Bldg.
Hauser, Victor Paul	U. of Minn., M. B., 1921	St. Paul, Minn., 696 Goodrich Ave.
Howard, Merrill Arthur	U. of Minn., M. B., 1921	Minneapolis, Minn., 3322 Oakland Av.
King, Frances Willard	U. of Minn., M. B., 1921	Minneapolis, Minn., University Hosp.
Langhoff, Arthur Harry	U. of Minn., M. B., 1921	Minneapolis, Minn., Swedish Hosp.
Lapierre, Arthur Paul	U. of Minn., M. B., 1921	Minneapolis, Minn., 319 Univ. Av. NE.
Lindquist, Richard Herman	U. of Minn., M. B., 1921	Minneapolis, Minn., 2300 16th Av. S.
Litman, Morris H.	U. of Minn., M. B., 1921	Minneapolis, Minn., University Hosp.
Litman, Samuel N.	U. of Minn., M. B., 1921	Duluth, Minn., 128 E 5th St.
Matsner, Eric M.	U. of Minn., M. B., 1921	Minneapolis, Minn., General Hosp.
Nesbit, Harold Thompson	U. of Minn., M. B., 1921	Minneapolis, Minn., 429 Union St. SE
Ott, William Oscar	Rush, M. D., 1914	Rochester, Minn.
Pankow, Louis Julius	U. of Minn., M. B., 1921	Minneapolis, Minn., University Hosp.
Parker, Harry Lee	Dublin U., 1918	Rochester, Minn.
Perley, Arthur Eugene	U. of Vermont, M. D., 1918	Rochester, Minn.
Peterson, Peter Eberhart	U. of Minn., M. B., 1921	Minneapolis, Minn., 201 Walnut St. SE.
Prentice, John Watson	U. of Minn., M. B., 1921	Minneapolis, Minn., 429 Union St. SE.
Puestow, Karver Louis	U. of Minn., M. B., 1921	Minneapolis, Minn., 509 E. River Road
Richter, Edward Henry	U. of Minn., M. B., 1921	Minneapolis, Minn., University Hosp.
Roberts, Frank Lester	U. of Minn., M. B., 1921	Minneapolis, Minn., N. W. Hosp.
Rogers, Richard Samuel	U. of Minn., M. B., 1921	Bismarck, N. D.
Rosenberg, Maurice N.	U. of Minn., M. B., 1921	Minneapolis, Minn.. 2910 James Av. S.
Rosenthal, Boles Albert	U. of Minn., M. D., 1917	St. Paul, Minn., 415 Iglehart
Rucker, William Henry	U. of Minn., M. B., 1921	Minneapolis, Minn., N. W. Hospital.
Ruhberg, Geo. Noel	U. of Minn., M. B., 1921	Minneapolis, Minn., 619 Ontario St. SE
Rumpf, Carl Walter	U. of Minn., M. B., 1921	Minneapolis, Minn., 429 Union St. SE.
Rumpf, William Henry, Jr.	U. of Minn., M. B., 1921	Faribault, Minn.
Sansby, J. Martin	U. of Minn., M. B., 1921	St. Paul, Minn., 972 Goodrich Av.
Siperstein, David Maurice	U. of Minn., M. B., 1921	Minneapolis, Minn., General Hospital.
Sisler, Clifford Edwin	U. of Minn., M. B., 1921	St. Paul, Minn., City Hospital.
Vail, James Bradford	U. of Minn., M. B., 1921	Minneapolis, Minn., General Hospital.
Van Beeck, Gregory	U. of Minn., M. B., 1921	Hastings, Minn.
Wheeler, Theodora	Johns Hopkins, M. D., 1916	Rochester, Minn.

THROUGH RECIPROCITY

Ellison, David Elias	U. of Ill., 1916	Minneapolis, Minn., 1500 Hennepin Av.
Fleming, Claude Filmore	Rush, 1903	Minneapolis, Minn., The Buckingham.
Gordon, Charles Howard	Bowdoin, 1919	U. of Minn., Minneapolis, Minn.
Greaves, Fredk. Clarence	U. of Iowa. 1920	New Market. Minn.
McCradie, Andrew Ross	U. of Ill., 1920	Hendrum, Minn.
Risser, Edward Daniel	U. of Iowa, 1918	Des Moines, Iowa, 1702 Arlington Av.
Strauss, Frederick Bismarck	Rush, 1901	Bismarck. N. D.

Thomas McDavitt, Secretary, St. Paul.

OF GENERAL INTEREST

Dr. John Mills, of Minneapolis, has become associated with Dr. H. M. Hursh, of Grand Rapids, Minn.

Dr. O. H. Rystad, of Crookston, has taken charge of Dr. L. A. Lane's practice during the latter's absence in the east.

Dr. Harold C. Habein, of Minneapolis, has opened offices in the LaSalle Building. He will specialize in internal medicine.

Dr. P. K. Dahl, of Minneapolis, has moved to Kensington, Minnesota, where he will engage in the practice of medicine.

Dr. A. S. Hoiland, of Argyle, has sold his practice to Dr. A .H. Nerad, who has been associated with him for some months.

Dr. C. C. Walker, of Lamberton, has located at Raymond, Minnesota, where he will take over the practice of Dr. Bergheim.

Dr. O. F. Melby, of Thief River Falls, is in Chicago where he is taking a post graduate course in eye, ear, nose and throat work.

Dr. Bernard Sorose, of Barnesville, is now located at Spring Grove, where he has formed a partnership with Dr. M. S. Nelson, of that place.

Dr. W. H. Rowe, of St. James, has gone to New York where he will spend three months studying treatment of the eye at the Herman Kratt Memorial Hospital.

Dr. Douglas, of the State Sanitorium medical Staff, at Walker, is in New York where he is taking a six weeks post graduate course in one of the large hospitals.

Dr. Rollier, of Minneapolis, has arranged to give a short post-graduate course of demonstrations of heliotherapy at Leysin (Switzerland) from August 16 to August 20th.

Dr. Albert Thompson, of St. James, has recently returned from Chicago where he has been taking a post graduate course in diseases of the eye, ear, nose and throat.

Dr. T. N. Fleming, of Cold Springs, has moved to St. Cloud, where he has opened offices. Dr. Fleming will limit his practice to diseases of the eye, ear, nose, and throat.

Dr. W. J. Mayo has recently been elected an honorary member of the Medico-Chirugical Society of Edinburgh. The honorary membership of this society is limited to ten.

Dr. J. A. Butz and family, of Monterey, are in California where they will remain until September. Dr. Hoffin, of Minneapolis has charge of Dr. Butz's practice during his absence.

Dr. A. J. Paulson has severed his connection with the Physicians Hospital at Thief River Falls, and has gone to Watertown, S. D., where he has become associated with the Watertown Clinic.

Dr. J. S. Collins, of Caledonia, has sold his practice to Dr. Boyd, of Iowa City, Iowa. Dr. Collins will open offices at Wabasha, and will be chief surgeon at St. Elizabeth's Hospital in that city.

Dr. Carl Fiske Jones, of Minneapolis, who has been associated with Dr. A. E. Benjamin for the past two years is leaving about August 8th for a year's study in Vienna. He will confine his work to obstetrics and gynecology.

The partnership of Drs. Rowe and Thompson, of St. James, has been dissolved and Dr. O. H. Ternstrom, of Bismarck, N. D., has become associated with Dr. Rowe. Dr. Thompson will continue in practice at St. James.

Dr. Alexander Stewart, A Fellow in Pediatrics in the Medical School of the University of Minnesota, who has just completed six months' service in the Mayo Foundation, has become associated with Dr. W. R. Ramsey, of St. Paul.

Dr. Rollis Holley, formerly of East Grand Forks, and who has been taking post graduate work at Kansas City since leaving the service a year ago, has recently joined the staff of physicians at the Warren Hospital, Warren, Minn.

Twenty-five Fellows entered service in the Mayo Foundation July 1; they are majoring in the following: general medicine 10, general surgery 4, orthopedic surgery 1, ophthalmology 1, otolaryngology 1, pediatrics 2, dermatology 2, and dental surgery 4.

Dr. Charles E. Proshek, of New Prague, who for the past two years has been with the American Red Cross in Asia and Europe, was recently transferred to the American Red Cross Commission in Greece, where he will act as aid to the Red Cross Commissioner. His headquarters will be at Saloniki, Greece.

The first issue of **The International Journal of Gastro-Enterology** appeared recently and is devoted as its name implies to diseases of the digestive tract and allied branches of medicine. A unique policy of the Journal will involve the criticism and commentaries by four well known authorities on each article published.

Dr. Harold E. Robertson, formerly Director of Pathology and Bacteriology in the Medical School of the University of Minnesota, has been transferred to the staff of the Mayo Foundation of the University as Professor of Pathology. Dr. Robertson has also become a member of the staff of the Mayo Clinic as Head of the Section on Pathologic Anatomy.

At the annual dinner of the American Anesthetists in Boston, held at the time of the A. M. A. meeting, Dr. S. Adolphus Knopf, who was a leading advocate for the honoring of Morton by election to the Hall of Fame, stated it woul be a proud privilege for the Associated Anesthetists to place a bronze bust of Morton in the niche assigned him by the electors. This will be done on October 16, 1921, in celebration of the Diamond Jubilee Anniversary of Morton's first public demonstration of ether anesthesia. Anesthetists and other members of the profession interested are urged to send contributions at once to F. H. McMechan, Sec-Treas., Associated Anesthetists, Lake Shore Road, Avon Lake, Ohio.

MINNESOTA PUBLIC HEALTH ASSSOCIATION

The appointment of Dr. William F. Wild as Executive Secretary of the Minnesota Public Health Association has been announced by Dr. C. L. Scofield, President of the Health Association. Dr. Wild took office July 1, and succeeds Dr. H. W. Hill, who resigned to become director of the Institute of Public Health at London, Ontario, Canada.

The policy of the Association to prevent disease, tuberculosis in particular, and to help every person in Minnesota to be healthy and efficient through demonstration, legislation, and education; that is, by demonstrating the methods of keeping well, by educating the public in the rules of health, and by securing the passage of laws which will provide for the protection of health, will be continued under Dr. Wild's leadership, the Association states.

The past year's work has been marked for its accomplishments according to the Executive Committee, the governing body of the Association. Some 43,307 persons have been given expert medical examination and advice free in the 699 health clinics given under the auspices of the Minnesota Public Health Assoociation and the County Public Health Association; 200,000 school children have participated in the Minnesota Health Crusade, and performed daily the "health chores," such as, washing the hands before and after meals, drinking a certain amount of water, sleeping the required number of hours each night with windows open, eating cereals and vegetables, brushing the teeth regularly and taking a full bath frequently; 172,000 pamphlets on health have been distributed; a health journal has been published each week and sent to 5,000 persons; talks on health given, and all forms of health work encouraged and assisted. During the last session of the legislature the Minnesota bill for the protection of mothers and infants was sponsored and supported by the Minnesota Public Health Association and became a law. This bill provides for the state acceptance of the Sheppard-Towner bill in the event of its becoming a law. Other bills relating to the advancement of public health, such as those providing for appropriations for the work of the tuberculosis sanatoria and the State Board of Health were actively supported.

The work of the Minnesota Public Health Association is supported by the annual sale of Christmas seals.

CORRESPONDENCE

Minnesota
STATE BOARD OF HEALTH
Division of Preventable Diseases
University Campus

Minneapolis, Minn.,
June 21, 1921

Editor Minnesota Medicine.
Dear Doctor:

After July, 1921, the Poliomyelitis After-Care Work, which has been carried on by the State Board of Health since 1917, will be under the State Hospital for Indigent Crippled & Deformed Children.

As heretofore, you are asked to report, without delay, all frank and suspected cases of acute Anterior Poliomyelitis and Epidemic Meningitis directly to the Division of Preventable Diseases, University Campus, Minneapolis. Please also report frank and suspected cases of Epidemic (Lethargic) Encephalitis. As far as possible an Epidemiologist will be sent to study cases and assist in diagnosis and control of disease. Antimeningitis Serum will be sent on first train upon notification of meningitis cases. Special outfits for collection of spinal fluid are furnished on request.

All cases of Poliomyelitis reported to the State Board of Health will be referred to the State Hospital for follow-up after-care when convalescence sets in.

The transfer of this work to the State Hospital is made through action of the last Legislature upon recommendation of the State Board of Health with full knowledge and consent of the State Hospital authorities.

Respectfully,
A. J. CHESLEY,
Executive Officer.

NEW AND NON-OFFICIAL REMEDIES

During June the following articles have been accepted by the Council on Pharmacy and Chemistry for inclusion in New and Non-official Remedies:

The Abbott Laboratories:
Saligenin
Armour & Co.:
Suprarenalin Base
Suprarenalin Ointment
E. Biuhuber:
Santyl Capsules
The Calco Chemical Co.:
Amidopyrine-Calco
Hynson, Westcott & Dunning:
Tablets Mercurochrome 220-Soluble
H. A. Metz Laboratories:
Orthoform

Winthrop Chemical Co.:

Mesotan

Nonproprietary Articles:

Amidopyrine

Guaiacol Benzoate.—Benzosol.—The benzoic acid ester of guaiacol. Guaiacol benzoate is slowly decomposed in the intestinal tract into benzoic acid and guaiacol, which exert their usual action. It is said to be useful in the incipient pulmonary tuberculosis, as an intestinal antiseptic and a urinary antiseptic.

Guaiacol Benzoate—Seydel.—A brand of guaiacol benzoate N. N. R. Seydel Manufacturing Co., Jersey City, N. J. (Jour. A. M. A., June 4, 1921, p. 1575).

Saligenin—Abbott.—A brand of saligenin N. N. R. For a discussion of the actions, uses and dosage of saligenin, see New and Non-official Remedies 1921, p. 35. Abbott Laboratories, Chicago.

Santyl Capsules 7 drops.—Each capsule contains 7 drops of Santyl. See New and Non-official Remedies 1921, p. 270. E. Bilhuber, Inc., New York.

Silver Salvarsan.—A brand of silver arsphenamine N. N. R. For a description of the actions, uses and dosage of silver arsphenamine, see Jour. A. M. A., May 7, 1921, p. 1312. Silver Salvarsan is marketed in ampules containing respectively 0.05 Gm., 0.1 Gm., 0.15 Gm., 0.2 Gm., 0.25 Gm., 0.3 Gm., silver salvarsan. H. A. Metz Laboratories, New York (Jour. A. M. A., June 11, 1921, p. 1654).

Pituglandol-Roche.—An aqueous solution containing the active constituents of the posterior lobe of the pituitary gland of cattle free from preservatives. It is physiologically standardized on the isolated uterus of the virgin guinea-pig so that 1 Cc. corresponds in activity to 0.003 Gm. betaiminazolylethylamine hydrochloride. For a discussion of the actions and use see General Article, Pituitary Gland, New and Non-official Remedies 1921, p. 219. Pituglandol-Roche is marketed in ampules, each containing 1.1 Cc. Hoffman LaRoche Chemical Works, New York.

Pollen Antigens-Lederle.—Liquids obtained by extracting the dried pollen of plants with a liquid consisting of 67 per cent glycerine and 33 per cent saturated solution of sodium chloride. For the action and uses of pollen extract preparations, see New and Non-official Remedies 1921, p. 239. Pollen antigens-Lederle are supplied in 15 pollen unit strengths. They are marketed as follows: Series A, containing five vials containing, respectively 1.5, 3, 6, 12 and 15 pollen units. Series B, five vials containing 18, 30, 45, 60 and 90 pollen units. Series C, five vials containing, respectively, 150, 225, 300, 450 and 600 pollen units. Complete Series, containing the fifteen doses of Series A, B, and C. Diagnostic Test, containing 0.01 Cc. of a dilution representing 60 pollen units.

Pollen Antigen-Lederle (Ragweed).—A liquid prepared by extracting the proteins from the pollen of the ragweed.

Pollen Antigen-Lederle (Timothy).—A liquid prepared by extracting the protein from the pollen of the timothy. The Lederle Antitoxin Laboratories, New York (Jour. A. M. A., June 18, 1921, p. 1753).

Cholera Vaccine (Prophylactic) — Lederle.—A cholera vaccine (see New and Non-official Remedies 1921, p. 299) marketed in packages of two 1 Cc. vials containing, respectively, 4,000 and 8,000 million killed cholera vibrios; also in packages of t wo 10 Cc. vials containing, respectively, 4,000 and 8,000 million killed cholera vibrios per Cc. The Lederle Antitoxin Laboratories, New York.

Plague Vaccine (Prophylactic) — Lederle. — A plague vaccine (see New and Non-official Remedies 1921, p. 304), marketed in 1 Cc. vials containing 5,000 million killed plague bacilli; also in 10 Cc. vials containing 5,000 million killed plague bacilli per Cc. The Lederle Antitoxin Laboratories, New York.

Acne Mixed Vaccine—Gilliland.—A mixed bacterial vaccine (see New and Non-official Remedies 1921, p. 314) composed of B. acni vulgaris, staphylococcus albus and staphylococcus aureus in equal proportions. Marketed in packages of four 1 Cc. vials containing, respectively, 250, 500, 1,000 and 2,000 million killed bacteria; also in packages of four syringes containing, respectively, 250, 500, 1,000 and 2,000 million killed bacteria. Gilliland Laboratories, Ambler, Penna.

Suprarenalin.—Vials containing 1 grain suprarenalin (see Jour. A. M. A., May 14, 1921, p. 1353). Armour and Co., Chicago.

Suprarenalin Ointment.—An ointment containing 0.1 per cent. suprarenalin (see Jour. A. M. A., May 14, 1921, p. 1353), suspended in a petrolatum base. Armour and Co., Chicago (Jour. A. M. A., June 25, 1921, p. 1826).

PROPAGANDA FOR REFORM

"National Iodine Solution" Not Admitted to N. N. R.—The Council on Pharmacy and Chemistry considered National Iodine Solution, a proprietary of the National Drug Co., because inquiries indicated that it was brought extensively to the attention of physicians. The name implies that it is a solution of iodin, and the inference is given that it has the advantages of iodin without the disadvantages. According to the label, "each fluid ounce represents three grains proteo-albuminoid compound of iodin (National)"; also an alcohol declaration of 7 per cent. is made. Otherwise no information is given as to the composition either of the "solution" or of "Proteo albuminoid compound of Iodine." Analysis in the A. M. A. Chemical Laboratory indicates that each 100 c. c. contains about 7 c. c. of alcohol, 0.5 Gm. of zinc sulphate U. S. P., 0.03 Gm. iodin (the solution gave tests which indicated a very small amount of free iodin; most of the iodin was in the form of ordinary iodid), 0.01 gm. protein and some hamamelis water. While the preparation is claimed to contain 3 grains "proteo-albuminoid compound of iodine," yet the sum of the protein and iodin is equivalent to less than one fifth grain. The Council reports that it is evident that "National Iodine Solution" is not a solution of free (elementary) iodin as the name suggests; instead, it appears to be

a solution of zinc sulphate in witch hazel water containing less than 0.03 per cent. of combined iodin and not more than a trace of free iodin; that it is sold under unwarranted therapeutic claims, and that a similar or identical preparation sold to the public for the self treatment of gonorrhea by the National Drug Co., as Gonocol has been declared misbranded by the Federal authorities (Jour. A. M. A., June 4, 1921, p. 1592).

Reolo.—This is a "patent medicine" which is based on the theory which has no scientific foundation, that all disease is due to a deficiency or variation in the inorganic constituents—the "cell salts"—of the cells and blood. Reolo is claimed to furnish the needed cell salts and thus to cure diseases due to the deficiency. The asserted discovery of Reolo is described thus: " Dr. A. L. Reusing has finally succeeded in combining by electrical treatment the phosphates of calcium, sodium and iron with the phosphates of patassium and magnesium and has obtained a perfect combination of these revitalizing Cell Salts that he has named 'Reolo'...." The A. M. A. Chemical Laboratory reports that Reolo consists of grayish brown tablets having a sweet, chocolate-like and faintly bitter taste. Very small quantities of a phosphate and traces of magnesium and of an iron compound were present. Large amounts of calcium carbonate (chalk) and sucrose (cane sugar) were present. The tablets did not appear to be medicated in the usually accepted sense. From this examination it would appear that Reolo is essentially a mixture of sugar and chalk (Jour. A. M. A., June 11, 1921, p. 1697).

Disappointments in Endocrinology.—In the current enthusiasm for so-called endocrinology, medicine may become humiliated by the drift toward a sort of pseudoscience bolstered up with meaningless words and unfounded assumptions. Stewart deserves the thanks of the medical profession for the fearless and critical manner in which he has questioned (Endocrinology, vol. 5, p. 283 (May) 1921) much of the verbal rubbish that goes under the designation of the endocrinology of the suprarenals. There is something stinging, yet deserved in its implied rebukes, in the words of Dr. Stewart: "On the whole," he says, "it must be granted that hitherto the attempts made to evoke in animals a well marked syndrome characteristic of adrenal deficiency have been singularly disappointing. The contrast is great when we leave this desert, where the physiologists and experimental pathologists have wandered, striking many rocks but finding few springs, and pass into the exuberant land of clinical endocrinology flowing with blandest milk and honey, almost suspiciously sweet." How much longer will the medical profession continue to merit such criticism? Just so long as the profession continues to give serious consideration to pseudoscientific rubbish promulgated by the exploiters of organic extracts (Jour. A. M. A., June 11, 1921, p. 1685).

BOOK REVIEWS

THE STORY OF THE AMERICAN RED CROSS IN ITALY. Charles M. Bakewell. The MacMillan Co. 1920.

"The purpose of this book is not to give a detailed statistical account of Red Cross activities in Italy, that may be found in various Department Reports, but rather to tell the American people who contributed so generously to the Red Cross funds the simple tale of what their dollars did in Italy. It is a great and inspiring record and one in which Americans may well take pride."

The foregoing quoted from the Introduction of this book is a very excellent review of this interesting volume.

Read it and know the American Red Cross thoroughly.

EVERETT K. GEER.

ELECTRO-THERAPEUTICS FOR PRACTITIONERS. F. Howard Humphris. Oxford Medical Publications. 1921. Second Edition.

The second edition of this work has been entirely revised and partially rewritten making it half as large again as the first edition.

The author claims not to be offering a text book, but rather some systematized information based on personal observation as to the conditions amenable to electro-therapy.

For so small a book it seems quite complete.

EVERETT K. GEER.

CHEMICAL PHARMACOLOGY. Hugh McGuigan, Ph. D. P. Blakiston's Son & Co. 1921. $4.00.

This is an elementary treatise for under-graduates particularly and dwells upon pharmacology emphasizing the chemical side. The author believes the chemical aspect should receive more attention in the teaching of pharmacology and offers the book to that end.

EVERETT K. GEER.

FRENCH-ENGLISH MEDICAL DICTIONARY. Alfred Gordon, A. M. M. B. (Paris). P. Blakiston's Son and Co. 1921. $3.50.

This seems to be a very complete dictionary and will be welcomed by the many whose interest in French medicine was stimulated by the War.

EVERETT K. GEER.

HYGIENE OF COMMUNICABLE DISEASES. Francis M. Munson. Mr. Paul B. Hoeber. New York. 1920. $5.50.

This "a handbook for sanitarians, medical officers of the army and navy and general practitioners."

It presents clearly and concisely what is known today regarding the epidemiology and management of the communicable diseases.

The various subjects are well arranged and ably presented.

EVERETT K. GEER.

PRACTICAL DIETETICS. Alida Frances Pattee. A. F. Pattee, Publisher. 1920. Price $2.25.

This is the thirteenth edition of a most valuable work. It incorporates the latest results of research in dietetics and the latest diets of leading physicians and hospitals. No hospital should be without this volume. Every physician would profit greatly by reading it EVERETT K. GEER.

MEDICAL NOTES. Sir John Horder. Oxford University Press. 1920.

A handbook of one hundred and twelve pages which contains the remarks the author let fall in the Out-patient room and wards of St. Bartholomew's Hospital, London. The notes have been arranged under sixteen heads and are brief, succinct observations on conditions which the practitioner sees commonly.

The book is easily read and very worth while the reading. EVERETT K. GEER.

A PRIMER FOR DIABETIC PATIENTS. Russel M. Wilder, Ph. D., M. D., Mary A. Foley, Daisy Elithorpe. W. B. Saunders Co. 1921.

This is a handbook of seventy-five pages containing a brief outline of the principles of diabetic treatment, sample menus, recipes and food tables.

It is written for laymen in easily understood terms and should prove to be a very valuable adjunct in the education of diabetic patients.

EVERETT K. GEER.

MASSAGE AND EXERCISES COMBINED. Albrecht Jensen. Published by the author. New York City. 1920.

In his small volume of ninety-three pages the author presents a "novel method of real scientific movements combined with exercises, so that the benefits of both may be obtained simultaneously."

The excercises are intended for use in the home, no gymnastic equipment being necessary.

The average practitioner uses massage too seldom and thereby fails to employ a valuable therapeutic measure.

This volume should stimulate a new interest in massage movements combined with exercise.

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AMERICAN RED CROSS WORK AMONG THE FRENCH PEOPLE. Fisher Ames, Jr. The MacMillan Company. 1921. $2.00.

This is another volume dealing with Red Cross activities with the purpose of acquainting the American people more thoroughly with the broad scope of Red Cross efforts.

It deals more particularly with civilian relief work in France, a chapter not so widely known in this country as the work done among the military forces abroad.

EVERETT K. GEER.

FEEBLENESS OF GROWTH AND CONGENITAL DWARFISM. Murk Jansen (Holland). Oxford Medical Publications. 1921.

This is an exceedingly interesting work. It gives the result of studing the manner in which injurious influences will affect the growth of the individual.

This research attempts to work out two principles which the author enunciated in studying the nature and cause of "achondroplasia" viz:

"(1) Injurious agents affecting growing cell groups enfeeble their power of growth.

"(2) The measure in which growth is enfeebled in proportional to the rapidity of growth."

The book should be of prime interest to the orthopedist as it earnestly tries to display law and rules by which a large number of deformities are determined, and in some cases the means by which they may be forestalled.

Intensely interesting and worth while.

EVERETT K. GEER.

TREATISE ON PHARMACY. Chas. Caspair, Jr. Lea and Febiger. Sixth Edition. 1920. $8.00.

This is a standard text book on pharmacy for students and pharmacists.

The present volume is the sixth edition, having been thoroughly revised.

It is not intended as a substitute for the Pharmacopoeia and National Formulary, but serves as a guide for the intelligent use of them.

The work is quite complete. EVERETT K. GEER.

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